Executive Budget Summary

Mission

The Office of Nuclear Energy, Science and Technology (NE) is home to much of the Federal Government's expertise in nuclear technology. This expertise is critical to assuring that, through its unique technical resources, the United States Government has the ability to respond to issues related to nuclear technology, including energy resource issues, matters of national security, nuclear engineering education, nuclear research, and the production and distribution of isotopes for medical and research uses. The United States relies on nuclear energy technology to provide about a fifth of its electricity, to provide critical isotopes for health care and industry, to explore the solar system, and to enhance the nation's security. Many other countries in the world are even more reliant on nuclear energy, and nuclear energy will continue to become increasingly important as the next century unfolds. Because of our reliance on this vital technology for economic, energy, and national security, the Department of Energy invests in services, products, and technologies that are beyond the capability of private industry alone.

This budget is the second to be prepared under the Government Performance and Results Act of 1993. The Act requires Government agencies to prepare strategic plans, performance plans, and performance reports that measure progress against goals. The Department's Strategic Plan consists of four Business Lines and a Corporate Management activity. NE's many diverse programs contribute to the success of all of the Department's business line goals. Working with industry, academia, the national laboratories, other Government agencies, and international partners, the Office has established goals that derive from the Department's strategic plan and guide our day-to-day activities. NE's goals by DOE Strategic Plan objective follow:

Energy Resources Objective 2 - Ensure that a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact.

- Support innovative nuclear energy research and science (see Nuclear Energy Research Initiative)
- Address critical technology issues associated with existing nuclear power plants (see Nuclear Energy Plant Optimization)

Science and Technology Objective 2 - Deliver leading-edge technologies that are critical to the DOE mission and the Nation.

- Provide compact, safe, reliable nuclear power systems and related technologies to space, national security, and other customers (see Advanced Radioisotope Power Systems)
- Develop technologies for production and application of isotopes, support vital, advanced research that applies to DOE-produced research isotopes, and ensure a reliable supply of medical, research, and industrial isotopes (see Isotopes Production and Distribution)
- Manage DOE nuclear facilities in a safe, environmentally-sound, and cost effective manner and provide for the easy, cost-efficient use of relevant facilities by non-Federal researchers (see TRA Landlord)

- *Science and Technology Objective 4* - Use DOE assets as part of an Administration-wide effort to advance the Nation's science education and literacy.

  - Support improved U.S. nuclear education and research infrastructure (see University Reactor Fuel Assistance and Support)

- *Environmental Quality Objective 6* - Reduce the life-cycle costs of environmental cleanup.

  - Manage DOE facilities in a safe, environmentally-sound, and cost effective manner (see Uranium Programs)
  - Support implementation of the Secretary's anticipated April 1999 decision regarding future operation of FFTF for the future production of medical and industrial radioisotopes and other nuclear research and irradiation activities or permanent deactivation (see Fast Flux Test Facility)
  - Develop technologies needed to meet DOE spent nuclear fuel management and facility shutdown commitments (see Termination Costs)

In addition, NE is continuing to streamline its operations and organization to respond to the National Partnership for Reinventing Government objectives to make Government more effective, efficient, and responsive.

Strategy

In accomplishing its program objectives, the Office of Nuclear Energy, Science and Technology will engage research institutions in industry, U.S. universities, national laboratories, international organizations, and other countries in cooperative and collaborative efforts. The major program elements that contribute to the mission are: Advanced Radioisotope Power Systems, University Reactor Fuel Assistance and Support, TRA Landlord, Nuclear Energy Plant Optimization, Nuclear Energy Research Initiative, Termination Costs, Fast Flux Test Facility, Isotope Production and Distribution, Uranium Programs, and Program Direction. Program accomplishments that will enable NE to achieve it's mission are identified in the detailed program budget submissions. Programs that make up the NE budget are funded in the Energy Supply appropriation account.

Funding Summary

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Energy Supply			
Nuclear Energy R&D	54,246	73,766	87,345
Termination Costs	88,149	85,000	65,000
Fast Flux Test Facility	0	30,000 [a]	30,000
Isotope Support	19,473	21,500	21,000
Uranium Programs	44,633 [b]	49,000 [b]	41,000
Program Direction	21,000 [c]	24,700 [c]	24,960
Use of Prior Year Balances	-8,221	-3,546	0
Total, Energy Supply	219,280	280,420	269,305

Major Changes

The International Nuclear Safety Program and Highly Enriched Uranium Transparency Program have been moved to the Office of Nonproliferation and National Security (NN) and are not included in the FY 2000 Office of Nuclear Energy, Science and Technology budget request. In addition, the Department's budget includes a new program, the Nuclear Energy Plant Optimization program.

Major Issues

Fast Flux Test Facility (FFTF)

In the Spring of 1999, the Department will decide whether to permanently deactivate the FFTF or to conduct an Environmental Impact Statement to consider its operation in support of a range of national research reactor requirements. The FY 2000 request would fund minimum surveillance and maintenance of the FFTF to keep it in a safe and environmentally-compliant condition. The FY 2000 request is adequate to support minimum surveillance and maintenance of the facility, however funding above the FY 2000 request level would be required to restart, permanently shutdown, or maintain the facility in its current condition.

[a] Excludes $9.2 million of prior year balances reprogrammed into this account in FY 1998.

[b] Includes funding for Transparency Measures ($15.4 million in FY 1998 and $13.6 million in FY 1999) which transferred to the Office of Nonproliferation and National Security.

[c] Includes funding for Salaries, Benefits, Travel, and administrative expenses associated with the International Nuclear Safety Program and Transparency Measures which ($3.125 million in FY 1998 and $3.458 million in FY 1999, plus $192K in prior year funds) transferred to the Office of Nonproliferation and National Security.

Termination Costs

After completion of the operational phase of the electrometallurgical treatment technology demonstration project on spent Experimental Breeder Reactor-II (EBR-II) fuel, the Department will evaluate the suitability of the technology for full-scale treatment of the remaining inventory of EBR-II spent fuel. The Department's decision to proceed with electrometallurgical processing will be based, in part, on the results from the National Academy of Sciences' review, as well as the completion of an Environmental Impact Statement. The FY 2000 budget request provides limited funding for the application of electrometallurgical technology since full-scale processing of EBR-II spent fuel will not commence immediately after completion of the demonstration project.

Site Funding

Site funding is provided in individual decision units.

Program Performance Measures

Key program performance measures used to judge the effectiveness of each program element are shown below. In addition to the technical effectiveness measures shown, program progress, customer satisfaction, and employee satisfaction are monitored to ensure that NE's programs are relevant and managed in a cost-effective manner.

Advanced Space Power Systems (ST-2)

- In FY 1998, executed a multi-year contract for the development of highly efficient radioisotope power systems in support of NASA's future mission requirements. **(Fully Successful)**

- In FY 2000, complete an Environmental Impact Statement and establish a Record of Decision on whether to proceed to develop a domestic plutonium-238 production capability for future space missions.

- Complete development and initiate operations for startup by the end of FY 2000 of a capability to recover plutonium-238 scrap for reuse for ongoing and future missions.

- Develop a new technologically-advanced power system for 21st century space exploration and test a demonstration unit in FY 2000.

University Reactor Fuel Assistance and Support (ST-4)

Support U.S. universities' nuclear energy research and education capabilities by:
  - **S** Providing fresh fuel to all university reactors requiring this service.
  - **S** Funding universities with research reactors for reactor upgrades and improvements (at least 20 in FY 1999; and at least 23 in FY 2000).
  - **S** Partnering with private companies to fund DOE/Industry Matching Grants Program for universities (19 or more in FY 1999; and 17 or more in FY 2000).
  - **S** Increasing the funding for Reactor Sharing in FY 1999 by 40 percent over FY 1998, and in FY 2000 by 20 percent over FY 1998, enabling each of the 26 schools involved in the program to improve the use of their reactors for teaching, training, and education within the surrounding community.

Attract outstanding U.S. students to pursue nuclear engineering degrees by:
  - **S** Increasing the number of Fellowships (from 14 in FY 1998 to 22 in FY 1999 and 18 in FY 2000).
  - **S** Increasing the number of Nuclear Engineering Education Research Grants (in FY 1999 existing and new grants will total 43; and in FY 2000 existing and new grants will total approximately 45).
  - **S** Providing summer on-the-job training to junior and senior nuclear engineering scholarship recipients (29 in FY 1999, 25 in FY 2000) .

Test Reactor Area Landlord (ST-2)

Continue to upgrade the physical plant and site infrastructure in accordance with the long range plan to ensure safe and reliable operation of Test Reactor Area site facilities.

Nuclear Energy Plant Optimization (ER-2)

In FY 1999, complete Memorandums of Understanding with the Nuclear Regulatory Commission and the Electric Power Research Institute (EPRI) to guide future implementation of the Joint DOE-EPRI Strategic Research and Development Plan to Optimize U.S. Nuclear Power Plants.

In FY 2000, implement a cooperative R&D program to address technical questions that could prevent continued operation of current nuclear plants by working with industry, universities, and national laboratories.

Nuclear Energy Research Initiative (ER-2)

In FY 1999, establish a peer-reviewed Nuclear Energy Research Initiative, initially funded at $19 million, to select and conduct investigator-initiated innovative scientific and engineering research that will address the issues facing the future of nuclear power in the U.S., including proliferation concerns, economics, and the management of nuclear waste.

- In FY 2000, advance the state of scientific knowledge and technology to enable incorporation of improved proliferation resistance in the design, development, and deployment of new reactor and nuclear fuel systems.

- In FY 2000, improve the understanding of reactor systems, component technology and nuclear fuel performance so one or more new reactor and one or more new fuel cycle concepts are identified which offer improved proliferation resistance, and the prospects of improved performance and efficiency, lower cost, and enhanced safety.

- In FY 2000, identify one or more proliferation resistant reactor concepts for low power and/or modular design applications.

Termination Costs (EQ-6)

- Complete the demonstration of the electrometallurgical spent fuel treatment technology by the end of FY 1999 using Experimental Breeder Reactor-II spent nuclear fuel.

- Complete the conversion and disposition of 100 percent of the secondary sodium coolant from the Experimental Breeder Reactor-II and 40 percent of the Fermi reactor sodium coolant in storage at Argonne National Laboratory-West.

- Determine by September 1999 whether electrometallurgical waste forms perform better than borosilicate glass under conditions consistent with the requirements being developed for the Department's geological repository license application.

- In FY 2000, complete the draining and processing of EBR-II primary sodium.

- In FY 2000, complete a National Environmental Policy Act review on the use of electrometallurgical technology to treat EBR-II and other sodium-bonded fuel in the Department's spent fuel inventory.

- In FY 2000, complete documentation of the operational phase of the demonstration project and resulting data from the electrometallurgical technology demonstration.

- Develop technical basis to support a DOE decision in FY 2000 on future application of the electrometallurgical treatment technology in the disposition of DOE spent nuclear fuels.

- In FY 2000, develop preliminary cost estimates and schedules for deactivating the Fuel Conditioning Facility and the Sodium Processing Facility.

Fast Flux Test Facility (EQ-6)

Maintain the Fast Flux Test Facility in a safe, environmentally-compliant standby condition to permit implementation of an anticipated Secretarial decision in FY 1999 to deactivate or pursue potential restart to support a range of national research reactor requirements.

In FY 2000, meet all Federal and State safety and environmental requirements for the Fast Flux Test Facility while implementing a Secretarial decision on the facility.

Isotope Production and Distribution (ST-2)

In FY 1998, completed 80 percent of the Sandia Hot Cell Facility construction modifications and processing equipment installation activities needed to achieve the facility capability to process 100 percent of the U.S. demand for molybdenum-99. **(Fully Successful)**

In FY 1999, initiate construction and commissioning of the Los Alamos Target Irradiation Station, improving isotope quality and improving operating efficiency.

In FY 1999, complete equipment installation necessary for an emergency backup supply of molybdenum-99, issue a request for proposals to privatize molybdenum-99 production and business activities by May 1999, and after evaluation, award a contract by September 1999 to the most qualified firm.

By the end of FY 2000, complete at least 60 percent of the construction of the Los Alamos Target Irradiation Station, which is needed for the production of short-lived isotopes for medical research.

In FY 2000, implement the Advanced Nuclear Medicine Initiative by providing isotopes or financial assistance for up to five researchers.

Complete privatization activities associated with production and sales of commercial isotopes by the end of FY 2000.

Supply quality stable and radioactive isotopes for industrial, research, and medical applications that continue to meet customer specifications and maintain 95 percent on-time deliveries. **(Fully Successful in FY 1998)**

In FY 2000, invest in two new process development technologies as requested by researchers that enhance isotope production, services and delivery application systems.

Respond to customer requests for information within 48 hours.

Keep customer complaints to less than four percent of all deliveries made.

Hold annual stakeholder meetings in conjunction with international and regional trade shows.

Uranium Programs (EQ-6)

- In FY 1998, completed the dilution of about 14 metric tons of excess highly enriched uranium (approximately 3.5 metric tons in FY 1998) to LEU at the Portsmouth Gaseous Diffusion Plant. **(Fully Successful)**

- In FY 1998, completed 80 percent of the final Programmatic Environmental Impact Statement for selecting the long-term management strategy for the depleted UF_6. **(Successful)**

- Meet all commitments to the Ohio Environmental Protection Agency and the Defense Nuclear Facilities Safety Board to ensure the safety of the Department's inventory of depleted uranium hexafluoride.

- In FY 2000, through the National Environmental Policy Act decision-making process, establish and begin implementing a long-term strategy for the management of the Department's depleted uranium hexafluoride inventories.

- Meet all legal commitments for post-retirement life and medical costs for retirees who supported the Uranium Enrichment Program before July 1, 1993.

- Maintain compliance with the Toxic Substances Control Act (TSCA), the Uranium Enrichment TSCA Federal Facilities Compliance Agreement (FFCA), DOE orders and other requirements and perform minimal corrective maintenance and inspections.

William D. Magwood, IV **Date**
Director, Office of Nuclear Energy, Science and Technology

Nuclear Energy R&D

Program Mission

The mission of the Nuclear Energy Research and Development program is to conduct advanced research and development in areas such as nuclear power and space power systems. In addition, this program supports nuclear engineering education and the enhancement of the Nation's nuclear science infrastructure.

The Nuclear Energy Research and Development program supports the DOE Strategic Plan and the FY 2000 Performance Plan as follows:

- *Energy Resources Objective 2* - Ensure that a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact.

  - FY 2000 Strategy - Nuclear Energy Plant Optimization (NEPO)

  The Department will conduct government-industry cost-shared, peer-reviewed research and development to address the issues associated with long term operation of existing nuclear power plants and to apply new technology to improve plant reliability and availability. The program will be conducted on a 50-50 cost-shared basis with industry consistent with the updated Joint DOE-Electric Power Research Institute Strategic Research and Development Plan to Optimize U.S. Nuclear Power Plants to be issued in FY 1999. The Department and NRC coordinate program planning to assure that their research and development activities are complimentary, cost-effective, and without duplication. The Subcommittee on Operating Nuclear Power Plant Research, Coordination, and Planning of the Nuclear Energy Research Advisory Committee (NERAC) will provide the Department advice on the conduct of the NEPO research and development program and prioritize the research the Department will conduct with industry.

  - FY 2000 Strategy - Nuclear Energy Research Initiative (NERI)

  The Department will conduct investigator-initiated, peer-reviewed research and development at universities, national laboratories, and industrial organizations to advance the scientific knowledge base and develop new technologies that will, as anticipated by the President's Committee of Advisors on Science and Technology (PCAST) Panel on Federal Energy Research and Development, address the principal obstacles to the expanded use of nuclear energy, and advance the state of nuclear technology for a competitive marketplace. The Nuclear Energy Research Advisory Committee will provide the Department advice on the NERI research and development program.

Science and Technology Objective 2 - Deliver leading-edge technologies that are critical to the DOE and the Nation.

- FY 2000 Strategy - Advanced Radioisotope Power Systems

The Department will develop, demonstrate, test, and deliver advanced radioisotope power systems for space and national security missions.

- FY 2000 Strategy - TRA Landlord

The Department will identify, fund, and perform site maintenance, construction upgrade projects, and environmental compliance activities in accordance with DOE, Federal, and State requirements.

Science and Technology Objective 4 - Use DOE assets as part of an Administration-wide effort to advance the Nation's science education and literacy.

- FY 2000 Strategy - University Reactor Fuel Assistance and Support

The Department will support and promote university, college, and precollege technology programs that deliver information and contribute to learning in nuclear science and engineering education, enable advanced educational research opportunities, build capabilities at educational institutions, and improve educational opportunities for diverse groups.

Program Goals

Advanced Radioisotope Power Systems (ST-2)

Provide compact, safe, reliable nuclear power systems and related technologies to space, national security and other customers.

University Reactor Fuel Assistance and Support (ST-4)

Support improved U.S. nuclear education and research infrastructure.

TRA Landlord (ST-2)

Manage DOE nuclear facilities in a safe, environmentally-sound, and cost effective manner and provide for the easy, cost-efficient use of relevant facilities by non-Federal researchers.

Nuclear Energy Plant Optimization (ER-2)

Conduct cooperative, cost-shared, peer-reviewed R&D with industry to reverse the trend of premature closures of existing operating commercial nuclear power plants. This R&D will address the complex technical issues associated with managing the long-term effects of plant aging while improving plant reliability and efficiency.

Nuclear Energy Research Initiative (ER-2)

Sponsor investigator-initiated, peer-reviewed R&D on new technologies that will address the principal obstacles to the future use of nuclear energy, and advance the state of nuclear technology for a competitive marketplace.

Program Objectives

Advanced Radioisotope Power Systems (ST-2)

Maintain and enhance the U.S. capability to build advanced radioisotope power supplies for ongoing and future national security applications and NASA space exploration missions. *(Program Objective 1)*

Develop a new advanced, highly efficient radioisotope power system that meets more stringent weight requirements of future space missions and reduces the amount of Pu-238 that is used. *(Program Objective 2)*

University Reactor Fuel Assistance and Support (ST-4)

Provide fuel assistance, fellowship grants, reactor upgrade funding, and other assistance to U.S. universities, in cooperation with industry. *(Program Objective 1)*

TRA Landlord (ST-2)

Ensure that TRA common use facilities and the utility infrastructure are maintained and operated to meet the requirements of tenant programs and in accordance with Federal and state environment, safety and health laws and regulations. *(Program Objective 1)*

Nuclear Energy Plant Optimization (ER-2)

Implement selected activities from the DOE/EPRI Joint Strategic R&D Plan in cooperation with the utility industry, universities, national laboratories, and the Nuclear Regulatory Commission to develop advanced technologies and methodologies that will enhance nuclear generation capability, productivity, and economics. *(Program Objective 1)*

Nuclear Energy Research Initiative (ER-2)

- Develop new reactor concepts, and scientific and technology breakthroughs in nuclear energy which enhance the performance, efficiency, reliability, proliferation-resistance, and economics of nuclear power. *(Program Objective 1)*

Performance Measures

Advanced Radioisotope Power Systems (ST-2)

- In FY 1998, executed a multi-year contract for the development of highly efficient radioisotope power systems in support of NASA's future mission requirements. *(Performance Measure supports Program Objective 2)* **(Fully Successful)**

- In FY 2000, complete an Environmental Impact Statement and establish a Record of Decision on whether to proceed to develop a domestic plutonium-238 production capability for future space missions. *(Performance Measure supports Program Objective 1)*

- Complete development and initiate operations for startup by the end of FY 2000 of a capability to recover plutonium-238 scrap for reuse for ongoing and future missions. *(Performance Measure supports Program Objective 1)*

- Develop a new technologically advanced power system for 21st century space exploration and test a demonstration unit in FY 2000. *(Performance Measure supports Program Objective 2)*

University Reactor Fuel Assistance and Support (ST-4)

- Support U.S. universities' nuclear energy research and education capabilities by: *(Performance Measure supports Program Objective 1)*
  - Providing fresh fuel to all university reactors requiring this service.
  - Funding universities with research reactors for reactor upgrades and improvements (at least 20 in FY 1999; and at least 23 in FY 2000).
  - Partnering with private companies to fund DOE/Industry Matching Grants Program for universities (19 or more in FY 1999; and 17 or more in FY 2000).
  - Increasing the funding for Reactor Sharing in FY 1999 by 40 percent over FY 1998, and in FY 2000 by 20 percent over FY 1998, enabling each of the 26 schools involved in the program to improve the use of their reactors for teaching, training, and education within the surrounding community.

Attract outstanding U.S. students to pursue nuclear engineering degrees by: *(Performance Measure supports Program Objective 1)*
  - **S** Increasing the number of Fellowships (from 14 in 1998 to 22 in FY 1999 and 18 in FY 2000).
  - **S** Increasing the number of Nuclear Engineering Education Grants (in FY 1999 existing and new grants will total 43; and in FY 2000 existing and new grants will total approximately 45).
  - **S** Providing summer on-the-job training to junior and senior nuclear engineering Scholarship recipients (29 in FY 1999; and 25 in FY 2000) .

TRA Landlord (ST-2)

Continue to upgrade the physical plant and site infrastructure in accordance with the long range plan to ensure safe and reliable operation of Test Reactor Area site facilities. *(Performance Measure supports Program Objective 1)*

Nuclear Energy Plant Optimization (ER-2)

In FY 1999, complete Memorandums of Understanding with the Nuclear Regulatory Commission and the Electric Power Research Institute (EPRI) to guide future implementation of the Joint DOE-EPRI Strategic Research and Development Plan to Optimize U.S. Nuclear Power Plants. *(Performance Measure supports Program Objective 1)*

In FY 2000, implement a cooperative R&D program to address technical questions that could prevent continued operation of current nuclear plants by working with industry, universities, and national laboratories. *(Performance Measure supports Program Objective 1)*

Nuclear Energy Research Initiative (ER-2)

In FY 1999, establish a peer-reviewed Nuclear Energy Research Initiative, initially funded at $19 million, to select and conduct investigator-initiated innovative scientific and engineering research that will address the issues facing the future of nuclear power in the U.S., including proliferation concerns, economics, and the management of nuclear waste. *(Performance Measure supports Program Objective 1)*

In FY 2000, advance the state of scientific knowledge and technology to enable incorporation of improved proliferation resistance in the design, development, and deployment of new reactor and nuclear fuel systems. *(Performance Measure supports Program Objective 1)*

In FY 2000, improve the understanding of reactor systems, component technology and nuclear fuel performance so one or more new reactor and one or more new fuel cycle concepts are identified which offer improved proliferation resistance, and the prospects of improved performance and efficiency, lower cost, and enhanced safety. *(Performance Measure supports Program Objective 1)*

In FY 2000, identify one or more proliferation resistant reactor concepts for low power and/or modular design applications. *(Performance Measure supports Program Objective 1)*

Significant Accomplishments And Program Shifts

Advanced Radioisotope Power Systems (ST-2)

Initiate testing of a new advanced radioisotope power system that is lighter and requires less plutonium-238 to support future NASA missions.

Initiate startup of a capability to recover plutonium-238 scrap for reuse for ongoing and future missions.

University Reactor Fuel Assistance and Support (ST-4)

Award fellowships to outstanding and promising M.S. and Ph.D. students engaged in nuclear science research and training to ensure an adequate supply of trained nuclear personnel.

Award Nuclear Engineering Education Research grants to competitively selected universities which promote innovative research in nuclear engineering technologies.

TRA Landlord (ST-2)

Continue the final construction phases of the TRA Fire and Life Safety Upgrade construction project on schedule.

Begin the construction phase of the TRA Electrical Utility Upgrade construction project.

Nuclear Energy Plant Optimization (ER-2)

In FY 1999, update the DOE - Electric Power Research Institute (EPRI) Strategic Research and Development Plan to Optimize U.S. Nuclear Power Plants consistent with the recommendations of the President's Committee of Advisors on Science and Technology (PCAST) Panel on Federal Energy Research and Development and the NERAC Subcommittee on Operating Nuclear Power Plants Research, Coordination, and Planning.

In FY 2000, implement the DOE - EPRI Strategic Plan working with national laboratories, the Nuclear Regulatory Commission, universities and industry conducting a cooperative R&D program guided by an industry/government coordinating committee.

Nuclear Energy Research Initiative (ER-2)

- In FY 1998, establish a Nuclear Energy Research Advisory Committee which will provide independent expert advice on the implementation of DOE nuclear energy R&D including the NERI program, with the first meeting held on November 17 and 18, 1998.

- In FY 1999, initiate the investigator proposed, peer-reviewed Nuclear Energy Research Initiative as recommended by the President's Committee of Advisors on Science and Technology (PCAST) Panel on Federal Energy Research and Development.

- In FY 2000, issue the second phase of grants and cooperative agreements under the investigator proposed, peer-reviewed Nuclear Energy Research Initiative.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Nuclear Energy R&D					
Advanced Radioisotope Power Systems	39,907	37,000	0	37,000	37,000
University Reactor Fuel Assistance and Support	7,000	11,000	0	11,000	11,345
Test Reactor Area Landlord	7,339	6,766	0	6,766	9,000
Nuclear Energy Plant Optimization	0	0	0	0	5,000
Nuclear Energy Research Initiative	0	19,000	0	19,000	25,000
Total, Nuclear Energy R&D	54,246	73,766	0	73,766	87,345

Climate Change Technology Initiative (CCTI)
Departmental Crosscut

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Request	$ Change	% Change
Energy & Water Development					
Energy Supply					
Solar and Renewable	269,904	336,000	398,921	62,921	18.7%
Nuclear Energy	0	0	5,000	5,000	100.0%
Subtotal, Energy Supply	269,904	336,000	403,921	67,921	20.2%
Science	0	13,500	33,000	19,500	144.4%
Total, Energy & Water	269,904	349,500	436,921	87,421	25.0%
Interior and Related Agencies					
Energy Conservation R&D	450,215	525,701	646,515	120,814	23.0%
Fossil Energy R&D	0	23,890	36,776	12,886	53.9%
Energy Information Administration	0	2,500	3,000	500	20.0%
Total, Interior and Related Agencies	450,215	552,091	686,291	134,200	24.3%
Total, DOE Climate Change Technology Initative	720,119	901,591	1,123,212	221,621	24.6%

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Albuquerque Operations Office	3,115	10	10	0	0.0%
Los Alamos National Laboratory	11,125	9,062	10,635	+1,573	+17.4%
Sandia National Laboratory	600	500	500	0	0.0%
Total, Albuquerque Operations Office	14,840	9,572	11,145	+1,573	+16.4%
Chicago Operations Office					
Chicago Operations Office	1,064	1,412	1,160	-252	-17.8%
Argonne National Laboratory	10	110	110	0	0.0%
Total, Chicago Operations Office	1,074	1,522	1,270	-252	-16.6%
Idaho Operations Office					
Idaho Operations Office	75	75	100	+25	+33.3%
Idaho National Engineering and Environmental Laboratory	12,107	14,600	17,445	+2,845	+19.5%
Total, Idaho Operations Office	12,182	14,675	17,545	+2,870	+19.6%
Nevada Operations Office	617	0	0	0	0.0%
Oakland Operations Office	5,828	7,906	5,580	-2,326	-29.4%
Ohio Operations Office					
Ohio Operations Office	30	0	0	0	0.0%
Mound Plant	7,900	7,800	8,000	+200	+2.6%
Total, Ohio Operations Office	7,930	7,800	8,000	+200	+2.6%
Oak Ridge Operations Office					
Oak Ridge National Laboratory	4,400	6,302	8,740	+2,438	+38.7%
Oak Ridge Institute of Science and Education	575	1,025	1,150	+125	+12.2%
Total, Oak Ridge Operations Office	4,975	7,327	9,890	+2,563	+35.0%
Richland Operations Office					
Fluor Daniel Hanford	65	159	150	-9	-5.7%
Pacific Northwest National Laboratory	25	0	0	0	0.0%
Total, Richland Operations Office	90	159	150	-9	-5.7%
Savannah River Site	950	1,080	1,150	+70	+6.5%
All Other Sites	5,760	23,725	32,615	+8,890	+37.5%
Total, Nuclear Energy R&D	54,246	73,766	87,345	+13,579	+18.4%

Site Descriptions

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) is a U.S. Department of Energy (DOE) scientific research laboratory located in New Mexico. A portion of the Plutonium Facility-4 at the Technical Area-55 at LANL is dedicated to plutonium-238 (Pu-238) processing. This capability is the only existing Pu-238 processing capability within the DOE complex and is used to process and encapsulate Pu-238 used in radioisotope power sources for the National Aeronautics Space Administration (NASA) space exploration missions and national security applications.

Sandia National Laboratories

Sandia National Laboratories (SNL) is a U.S. Department of Energy scientific research laboratory located in New Mexico. SNL has unique analytical and testing capability used to evaluate radioisotope power system response during hypothetical launch accidents. These capabilities are used to support preparation of Safety Analysis Reports.

Argonne National Laboratory

Argonne National Laboratory (ANL) is a U.S. Department of Energy scientific research laboratory located in Argonne, Illinois. ANL has an ongoing program in cooperation with the governments of Germany, France and Japan in the area of international student exchange. This program sends highly qualified U.S. students to study nuclear engineering at facilities in the above three countries for a 3-4 month period and permits students from those countries to study nuclear engineering at ANL.

Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory (INEEL) is an extensive research and engineering complex that has focused on some of the most advanced energy research in the world since 1949. In recent years, in addition to continued operation of complex nuclear and non-nuclear facilities, the INEEL has initiated technology development in applied environmental science and engineering. The Idaho Test Reactor Area (TRA) is located within the INEEL. Since the early 1950s, test reactors, laboratories, hot cells and supporting facilities have been built at TRA. The principal facility operating at TRA is the Advanced Test Reactor (ATR). The ATR is one of the world's largest and most advanced test reactors. It provides both vital irradiation testing for reactor fuels and core components and isotopes critically needed by medicine and industry. Other facilities currently operating on the site are: the ATR Critical Facility reactor, the TRA Hot Cells and the INEEL Applied Engineering and Development Laboratory. ATR operations and a wide variety of scientific research projects are planned to continue at TRA until well into the twenty-first century. The following facilities at TRA are shutdown in a surveillance and maintenance status awaiting decontamination and decommissioning: the Materials Test Reactor (MTR), the MTR Canal, the Engineering Test Reactor, the Coupled Fast Reactivity Measurement Facility, and the Advanced Reactivity Measurement Facility. TRA is operated for the

Department by Lockheed Martin Idaho Technologies Company. Responsibility for TRA Landlord resides with the Office of Nuclear Energy, Science and Technology. The TRA Landlord account provides for maintaining and upgrading TRA common use facilities and the utility infrastructure to ensure that programmatic, reliability and ES&H requirements are met.

INEEL manages the University Reactor Fuel Assistance Program to provide fuel for university test, research, and training reactors, the shipping of spent fuel from university reactors to Savannah River, and conversion of university reactors from high enriched uranium (HEU) to low enriched uranium (LEU). INEEL provides management, quality assurance, procurement, and technical assessment and review associated with the manufacturing, shipment, and receipt inspection assessment and evaluations of replacement fuel and the conversion of HEU fuel to LEU fuel for university reactors, and the shipping of spent fuel from these reactors.

Mound Plant

The Mound Plant is located in southwest Ohio with the city of Miamisburg. Previously, the main mission of the Mound Plant was to manufacture components for nuclear weapons for Defense Programs. As part of the Department's Non-nuclear Consolidation Plan, the Department decided to consolidate Defense Program activities to other sites and transferred the Mound site to the Office of Environmental Management for cleanup and transition of the facilities and properties to commercial operations. Only the facilities used to assemble and test radioisotope power systems used for NASA space exploration missions and national security applications remain in use by DOE Programs. The program is currently conducting a study on whether to consolidate and maintain the radioisotope power system assembly and test capability as a stand-alone operation at the Mound site or transfer the operation to another Department site.

Oak Ridge National Laboratory

The Oak Ridge National Laboratory (ORNL) is a U.S. Department of Energy scientific research laboratory located in Oak Ridge, Tennessee. The ORNL has developed the unique capabilities for fabricating carbon insulator and iridium heat sources components for radioisotope power sources used for NASA space exploration missions and national security applications. These sophisticated heat source components are necessary for the safe operation of these power systems during normal operation and during launch, reentry or other deployment accidents.

Savannah River Site

The Savannah River Site is located in the Central Savannah River Area of South Carolina. The Office of Nuclear Energy, Science and Technology is maintaining the Plutonium Fuel Form Facility in a safe environmentally shutdown mode until the facility is transferred to the Office of Environmental Management for decontamination and decommissioning.

All Other Sites

Funding supports a commercial contract to develop national security missions and an Interagency Agreement with the Navy Department to provide specialized safety analyses for the Advanced Radioisotope Power Systems.

Includes funding for the Nuclear Energy Research Initiative which is a new competitive, investigator-initiated program in FY 1999 that is in the solicitation phase as this document is being prepared; therefore, the universities, national laboratories and industrial organizations who will perform the scientific and engineering research have not yet been identified.

Funding in FY 2000 for the Nuclear Energy Plant Optimization program is also shown in this category. Decisions regarding the specific 50-50 cost-shared, peer-reviewed research and development activities to be conducted and the performing organizations will be made following the FY 1999 update of the Joint DOE-EPRI Strategic Research and Development Plan to Optimize U.S. Nuclear Power Plants. In formulating this program, the Department will utilize the advice of the Subcommittee on Operating Nuclear Power Plant Research, Coordination and Planning of the Nuclear Energy Research Advisory Committee.

Funding is also included for nuclear engineering fellowships and scholarships for outstanding graduate and undergraduate students which is awarded through a peer-reviewed, competitive process. The peer review committee is composed of nuclear engineering professors representing a broad spectrum of nuclear engineering programs throughout the U.S. The funding is then administered and awarded by the South Carolina University Research and Education Foundation for the Department of Energy.

Advanced Radioisotope Power Systems

Mission Supporting Goals and Objectives

The Advanced Radioisotope Power Systems program supports the development, demonstration, testing, and delivery of power systems required by the United States to support space exploration and special national security activities. Radioisotope power systems, for example, are the enabling technology for space and national security applications requiring proven, reliable and maintenance-free power supplies capable of producing up to several kilowatts of power and operating under severe environmental conditions for many years. Previous NASA space exploration missions that have used radioisotope power systems include the Apollo lunar scientific packages and the Pioneer, Viking, Voyager, Galileo and Ulysses spacecrafts. More recent missions that used radioisotope power systems are the Mars Pathfinder mission launched in December 1996 and the Cassini mission to Saturn launched in October 1997. Without these power systems, many of the NASA missions to explore deep space and surfaces of planets and moons could not be performed. A recent General Accounting Office report entitled "Space Exploration - Power Sources for Deep Space Probes" dated May 1998, reinforces the need for these systems.

Through early FY 1998, the Department's activities have focused on: (1) fabricating and delivering to NASA three new radioisotope thermoelectric generators (RTGs) and 157 heater units for the Cassini mission; (2) supporting NASA in obtaining approval to launch Cassini; (3) implementing emergency preparedness plans and operations for the Cassini launch which occurred on October 15, 1997; and (4) supporting ongoing national security missions. In FY 1998 program emphasis transitioned from Cassini-specific efforts to maintaining the facilities and expertise that are required to produce radioisotope power systems and; (1) developing and testing an advanced power system for future NASA missions, such as the Europa Orbiter or Pluto/Kuiper Express, that will occur soon after the turn of the century; and (2) a new national security mission which will require delivery of several RTGs over the next decade.

With NASA's current emphasis on smaller and less expensive spacecraft, future missions require an advanced power system that is more efficient, lighter weight, and uses less radioisotope fuel. Efforts are underway to meet this requirement by developing an Advanced Radioisotope Power System (ARPS) that uses a new technology called AMTEC. In FY 2000, the program will complete fabrication and initiate testing of module units of this technology for future space missions, proceed to design and initiate fabrication of a full scale qualification unit of the advanced power system and continue safety testing in support of preparation of environmental documentation and Safety Analysis Reports to cover the near-term NASA space missions. For the new national security mission, the program will continue testing of the more efficient thermoelectric element that will be used for this mission, proceed with design and fabrication of a new, improved RTG, continue development of the safety test data and proceed with the preparation of the Safety Analysis Report.

In FY 2000, the program will also continue developing new, non-mission-specific technologies that could be used in power supplies that could cover a range of power levels required to support future NASA space missions. These technologies include advanced conversion concepts, new materials, and new heat sources. Also, the program will continue to maintain the Plutonium Fuel Form Facility at the Savannah

River site in an environmentally sound, safe shutdown condition until it is transferred to the Office of Environmental Management (EM) for decontamination and decommissioning.

The Department is charged with the development of nuclear technologies and systems by the Atomic Energy Act of 1954, as amended, and is authorized by the Act to possess special nuclear materials and operate nuclear facilities. To meet this charter, the Department has developed the program capabilities and facility infrastructure to produce and deliver radioisotope power systems. To maintain the long-term viability for the program, and the space exploration and national security missions it enables, the Department must maintain these capabilities and the associated facility infrastructure as the sole national capability to produce radioisotope power systems.

The facility infrastructure for producing the power systems has been consolidated over the past few years to the three main operations described below. Without this infrastructure, radioisotope power systems cannot be produced, and without these power systems, critical national security activities and NASA missions to explore deep space and the surfaces of neighboring planets will not be possible. The facility infrastructure which must be sustained includes:

 # Iridium and Carbon Heat Source Component Fabrication Facilities at Oak Ridge National Laboratory

The Oak Ridge National Laboratory (ORNL) has developed the unique capability of fabricating carbon insulators and iridium cladding used to encapsulate and contain the plutonium-238 (Pu-238) pellets. These sophisticated heat source components are necessary for the safe operation of the radioisotope heat source during normal operation and during launch, reentry or other deployment accidents. The Department maintains its capabilities in this area through small scale production campaigns of these components for upcoming space missions and terrestrial applications. Advanced fabrication processes are being developed to improve the performance and to reduce the cost of fabricating these components. The materials properties of these components are characterized for input to mission safety analyses for the launch or deployment approval process. ORNL also performs materials testing and precious metal iridium inventory management for the Department's activities at other sites.

 # Plutonium-238 Processing and Encapsulation Facilities in the Technical Area-55 Complex at Los Alamos National Laboratory

The Department maintains a facility within the Plutonium Facility-4 at the Technical Area-55 at the Los Alamos National Laboratory (LANL) dedicated to Pu-238 processing. This is the only facility in the United States that can perform these operations. LANL receives the Pu-238 powder, performs incoming inspections, processes the powder through a complex set of operations to a pellet form, encapsules the pellets in the iridium cladding fabricated at ORNL, performs final inspection, and ships the encapsulated pellets to Mound (see following discussion) for assembly into heat sources. The Department maintains these operations through small-scale fabrication campaigns of encapsulated pellets for use in upcoming missions. LANL maintains the Pu-238 inventory for the Department. A Pu-238 scrap recovery line is being developed to recycle scrap for use on future programs. Startup activities to bring the scrap recovery line to full operation should be initiated by the end of FY 2000.

To minimize waste disposal costs, a new process is being developed to recover Pu-238 from the waste and dispose of the remaining byproducts. LANL also conducts safety and qualification tests on Pu-238 heat source components. LANL also fuels and assembles radioisotope heater units used on NASA space missions.

An important element of maintaining the operational readiness of the facilities is the repair and upgrading of equipment. Over the next several years, LANL will complete the program to replace equipment and glove boxes that have reached their useful lifetimes as a result of the large Pu-238 processing campaign required for the Cassini mission.

 # Heat Source and Power System Assembly and Testing Facilities at the Mound Site

The Department maintains and operates facilities at the Mound site for heat source and power system assembly and testing. These operations have been primarily conducted in two buildings identified as Buildings 38 and 50. Heat source modules were assembled in Building 38 as iridium encapsulated Pu-238 pellets were received from LANL and carbon components were received from ORNL. The national security power systems were also assembled in Building 38. The assembly of the heat sources into the generators and the acceptance testing and related functions are carried out in Building 50. This building is totally dedicated to the radioisotope power systems program. Since the power systems program used only a small part of Building 38, and this is an old building that is scheduled for demolition by EM as a part of the overall cleanup of the Mound site, the Department is consolidating the power systems efforts from Building 38 into Building 50. This consolidation will be completed in early FY 2000 to allow EM to proceed with their planned decontamination and decommissioning of Building 38.

The Department conducted an evaluation of transferring and consolidating the Mound operations at another site to streamline program operations and reduce infrastructure costs. Seven other sites as well as the option of remaining at Mound were included in the evaluation. Preparation of an Environmental Impact Statement (EIS) was initiated on five sites and the Mound site as a no action alternative. Since the rest of the Mound site is scheduled for cleanup and transfer to the private sector, the program efforts would become a stand alone operation at Mound. This stand alone operation at Mound is being more fully analyzed in terms of cost, safety, safeguard and security issues and a decision to proceed with the EIS is pending.

As part of its overall support of the power systems program, Mound also stores and maintains a spare RTG used for the Cassini Mission in monitored storage. In addition, Mound is developing new fabrication processes, including performing weld development studies for the heat source for the RTGs for the new national security mission and developing plans for the assembly and testing of the new advanced power system the Department is developing for future NASA missions. Mound also fabricates components for heater units which are fueled and assembled at LANL.

Another key issue facing the program is assuring that there is a long term supply of the Pu-238 isotope that is used in these power systems. Most of the current inventory of Pu-238 was produced in the reactors and processing facilities at Savannah River. However, the facilities used to produce the material are either shutdown or being phased out. The planned space and national security missions will exhaust the current inventory by the middle of the next decade and, unless an assured supply is established, the ability to support future space missions will be lost. Therefore, the Department is considering the potential of establishing a domestic supply using existing facilities to produce this non-weapons form of plutonium. An Environmental Impact Statement is being prepared as part of the planning and decision process.

The Department recognizes the need to minimize the costs associated with maintaining the programs and facility infrastructure associated with this program. As requested by Congress in the FY 1999 report language, a summary report has been prepared and transmitted separately that describes the action taken and considered to streamline the program to minimize costs.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Radioisotope Power Systems	32,097	29,200	27,600	-1,600	-5.5%
Special Applications	2,000	2,000	2,000	0	0.0%
Plutonium-238 Acquisition and Processing	5,810	5,800	7,400	+1,600	+27.6%
Total, Advanced Radioisotope Power Systems	39,907	37,000	37,000	0	0.0%

Detailed Program Justification

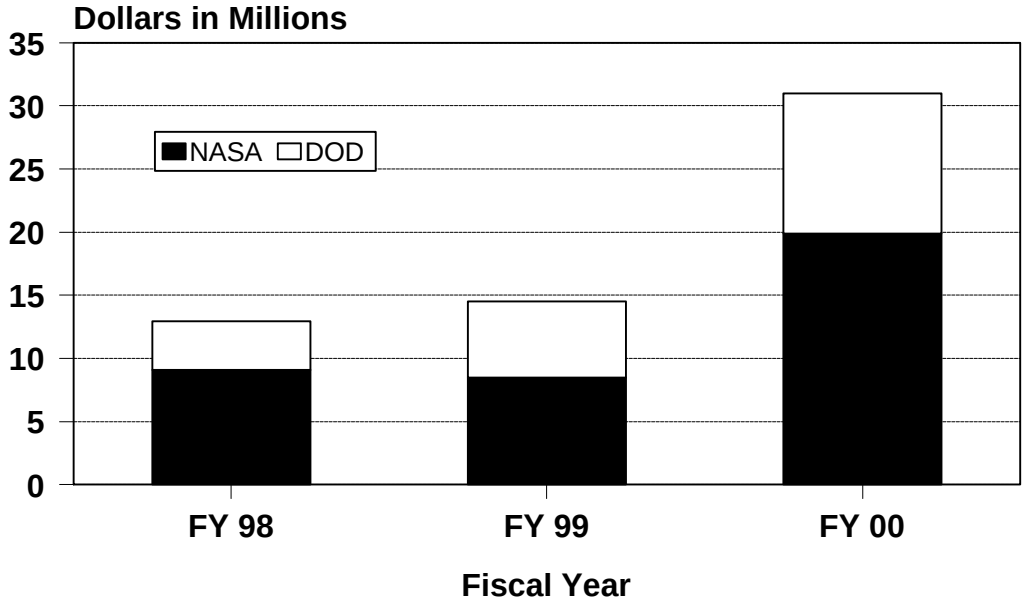
(dollars in thousands)

FY 1998	FY 1999	FY 2000

Radioisotope Power Systems

# Provide RTGs that satisfy NASA power requirements for the Cassini mission and supported Cassini launch in October 1997	3,974	0	0
# Maintain the program and facility operations and capabilities			

User Funding*



* The funds appropriated in Energy Supply are used to sustain the program and facility infrastructure that allows the Department to fulfill its charter to maintain radioisotope power system production capabilities for future space and national security missions. The user funding is provided to DOE by the sponsoring mission agencies for mission-specific development and hardware fabrication efforts. In FY 2000, NASA is expected to provide DOE with $19.9 million and DOD with $11.1 million.

# for current and future space and national security missions. Prepare facility operations for conduct of new NASA space missions and the new national security mission.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ Maintain iridium and carbon heat source component operations at ORNL. In FY 1998, 1999 and 2000 conduct production campaigns to fabricate components for new missions. In FY 1999, implement improved production process and complete qualification runs in FY 2000.	3,300	3,350	3,500
▸ Maintain Pu-238 processing and encapsulation operations at LANL. Conduct production runs in FY 1998, 1999, and 2000 to encapsulate Pu-238 for new missions. In FY 1999, initiate safety and qualification testing of Pu-238 purchased from Russia. In FY 2000, complete qualification of Russian Pu-238 and initiate production of heater units for new missions.	6,800	7,300	7,050
▸ Maintain and operate Mound facilities and maintain shipping casks. In FY 1998, 1999, and 2000 conduct production runs for heat sources. In FY 2000, initiate preparation of assembly and testing operations for new NASA space missions and new national security missions.	7,400	7,700	7,800
▸ Perform safety model development and analyses, review safety analyses reports, conduct performance and safety testing of advanced concepts, perform theoretical performance analyses for advanced concepts, perform future missions conceptual design studies, prepare environmental documentation, and perform safety analyses and prepare safety analyses reports for shipping casks, maintain and certify shipping casks, maintain the PuFF facility in a safe shutdown mode, and conduct special studies	5,172	2,570	2,600
▸ Continue program with industry, universities and laboratories to develop advanced technologies (converters, materials) for use in power systems with ranges of power levels for future NASA missions. Demonstrate use of a light weight, highly efficient converter technology for use in a power system for space or terrestrial mission. Develop and test heat sources for advanced systems	2,597	5,421	5,510

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ Continue facility modifications to allow consolidation of heat source and RTG assembly and testing operations into a single facility at the Mound Plant site	1,854 [a]	700 [a]	0
▸ Capital equipment funding for routine equipment replacement and procuring equipment for developing, assembling and testing new advanced power system . . .	1,000	2,000	1,000
▸ FY 99/00 Small Business Innovative Research and Small Business Technology Transfer programs	0	159	140
Total, Radioisotope Power Systems	32,097	29,200	27,600

[a] The Department had notified Congress that this funding was being redirected to prepare an Environmental Impact Statement on the potential relocation of Mound plant functions. If a decision is made to remain at Mound, the remaining funding will be used to support consolidation at Mound for stand alone operation, including updating Mound environmental documentation.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Special Applications			
# Satisfy user requirements to support ongoing and new national security programs	2,000	2,000	2,000
Plutonium-238 Acquisition and Processing			
# Develop Pu-238 scrap and waste recovery and disposal capabilities at Los Alamos National Laboratory for reuse of Pu-238 for future national security and NASA space missions			
▸ Perform design and safety analyses for scrap recovery line, purchase glove box equipment and initiate installation and perform bench scale testing for process equipment	1,575	0	0
▸ Complete installation of glove boxes, complete bench scale testing and initiate installation of process equipment	0	2,300	0
▸ Complete installation of scrap recovery line and initiate startup activities for full operation. Initiate conceptual design and safety analyses for waste recovery line and waste recovery by-products disposal. Procure long-lead time equipment.	0	400	2,100
▸ Capital equipment funding	1,625	400	260
# Evaluate and implement options for meeting near-term and long-term supply needs for Pu-238			
▸ Evaluate use of DOE reactor facilities for domestic production of Pu-238 and initiate preparation of conceptual design and preliminary cost estimate for the processing lines for target fabrication, target processing and neptunium storage facilities at the HFIR complex at ORNL	1,150	0	0
▸ Continue evaluation of DOE reactor facilities for domestic production of Pu-238, develop test target design, complete conceptual design of processing and storage facilities, and prepare environmental impact statement for domestic production of Pu-238.	1,460	2,700	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ Maintain option for a domestic supply option by obtaining a Record of Decision for domestic production of Pu-238, initiating test target irradiations, and proceeding with detail design of processing and storage facilities that will be built if decision is made to proceed	0	0	4,290
▸ Capital equipment funding	0	0	750
Total, Plutonium-238 Acquisition and Processing	5,810	5,800	7,400
Total, Advanced Radioisotope Power Systems	39,907	37,000	37,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Radioisotope Power Systems	
# The funding reduction defers lower-priority capital equipment expenditures.	-1,600
Plutonium-238 Acquisition and Processing	
# The increase in the Plutonium Acquisition and Processing sub-element is to ensure a long-term supply of Pu-238 by establishing a domestic Pu-238 production capability. With the expected new near-term space and national security missions, the current inventory of Pu-238 will be exhausted. In early FY 2000, the Environmental Impact Statement will be completed and a Record of Decision issued on whether to proceed to establish a domestic Pu-238 production capability. This capability is required to replenish the inventory and establish an assured long-term supply of Pu-238 for future missions.	+1,600
Total Funding Change, Advanced Radioisotope Power Systems	0

University Reactor Fuel Assistance and Support

Mission Supporting Goals and Objectives

To retain the capability in the U.S. to conduct research, address pressing environmental challenges, and help preserve the nuclear energy option, we must maintain the infrastructure necessary to educate and train the next generation of scientists and engineers. The University Reactor Fuel Assistance and Support program provides funding for our university nuclear engineering programs and university research reactors which play a major role in providing this education and training.

University nuclear engineering programs supply highly skilled workers to companies in fields such as electricity generation, medical research and supply, environmental restoration, and advanced materials, as well as to government agencies and national laboratories. To help ensure the continued viability of these programs, the Department provides assistance through nine distinct programs which include the DOE/Industry Matching Grants program. The Department also provides research funding to faculty through the Nuclear Engineering Education Research (NEER) program, and academic assistance through our Scholarships and Fellowships program for outstanding students in nuclear engineering and health physics.

University research reactors in the United States form a fundamental and vital component of our national research and education infrastructure. Research conducted using these reactors is critical to many national priorities such as health care, materials science, and energy technology. Currently, there are 28 operating university research reactors on 26 campuses in 20 states. University reactors are the source of neutrons for research in such diverse areas as medical isotopes, human health, life sciences, environmental protection, advanced materials, lasers, energy conversion, and food irradiation. University research reactors directly support the development of highly qualified, technically knowledgeable personnel needed by national laboratories, private industry, the Federal government and academia, for basic and applied research critical to U.S. technological competitiveness. In addition , with the help of the Reactor Sharing program, many of the reactors serve as centers for education programs offered to other colleges and universities and high school students and teachers who come to the reactor for instructional programs and research.

The University Reactor Fuel Assistance and Support program provides funding for shipment of fresh fuel to and spent fuel from university research reactors through our Fuel Assistance program allowing universities to continue their important research and education activities. The Reactor Upgrade program also provides funding for equipment upgrades at the reactors, to increase their value as research tools, supports students and faculty in the area of radiochemistry through our Radiochemistry program, provides educational assistance primarily in the form of scholarships and fellowships to minority, Hispanic and American Indian students within our Minority Support program and a new initiative in FY 2000 provides funding to prepare students for nuclear engineering and science careers by way of the Nuclear Education Recruitment program.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
University Reactor Fuel Assistance and Support	7,000	11,000	11,345	+345	+3.1%
Total, University Reactor Fuel Assistance and Support	7,000	11,000 [a]	11,345	+345	+3.1%

[a] Excludes $225K included in a FY99 reprogramming.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
University Reactor Fuel Assistance and Support			
# Continue to supply fresh fuel to and ship spent fuel from all university reactors requiring these services and begin conversion of a university reactor from high enriched uranium (HEU) to low enriched uranium (LEU) during FY 2000.	2,100	2,300	2,800
# Continue the Matching Grants Program in FY 2000, which supports education, training, and innovative research at participating universities. Provide grants of up to $50,000 (which are matched by industry) to 17 universities in FY 1998, up to19 or more in FY 1999 and 17 or more in FY 2000. An evaluation of the five year trial of the matching grants program conducted in FY 1997 recommended continuation and expansion of the program.	800	1,000	800
# Provide fellowships in FY 2000 for outstanding and promising United States M.S. and PhD. students engaged in nuclear science research and training at multiple U.S. universities and scholarships to undergraduate students. Also support development of education programs in nuclear engineering and related scientific fields at minority serving institutions. A total of 14 fellowships and 62 scholarships were awarded for FY 1998, approximately 22 fellowships and 67 scholarships are expected for FY 1999 and 18 fellowships and 62 scholarships are planned for FY 2000. .	1,100	1,400	1,300
# The Reactor Sharing program allows students and faculty at institutions without reactors to have access to university reactors for training, education, and research purposes. This program also allows the universities with reactors to conduct educational outreach programs in their local communities. In FY 1998, FY 1999 and FY 2000, 23 grants are planned with the level of funding for individual reactors varying each year.	500	700	600

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
# Continue in FY 2000 with the third year of the reactor upgrade program to assist in addressing the backlog of maintenance and upgrade of items confronting university-owned research reactors. The program provides for replacement of outdated equipment, maintenance of reactor systems, and upgrading of experimental capabilities at 16 university reactors in FY 1998, and approximately 20 and 23 reactors in FY 1999 and FY 2000 respectively. The purpose of this program is to ensure that these valuable educational and research tools are available into the next decade	300	800	845
# The Nuclear Engineering Education Research Grants Program was reinstated in FY 1998 with the awarding of 19 grants. In FY 1999, existing and new grants will total 43; and in FY 2000 existing and new grants will total approximately 45 to provide for innovative research in nuclear engineering at U.S. universities	2,200	4,500	4,500
# Begin a program in FY 2000 to support nuclear engineering education recruitment activities in conjunction with a professional society with expertise in nuclear science and technology to ensure a highly informed group of students entering university nuclear engineering and related scientific courses of study	0	0	200
# In FY 2000, the radiochemistry program will continue to provide faculty support and student fellowships and scholarships to help educate a new generation of radiochemists to address the technical challenges associated with radioactive wastes and contaminated sites	0	300	300
Total, University Reactor Fuel Assistance and Support	7,000	11,000 [a]	11,345

[a] Excludes $225K included in a FY99 reprogramming.

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
University Reactor Fuel Assistance and Support	
# Increase in reactor fuel account, reactor upgrades and a new initiative in nuclear engineering education recruitment with decreases in matching grants, fellowships and scholarships, and reactor sharing	+345
Total Funding Change, University Reactor Fuel Assistance and Support	+345

Test Reactor Area Landlord

Mission Supporting Goals and Objectives

The Idaho Test Reactor Area (TRA) is located within the Idaho National Engineering and Environmental Laboratory (INEEL). Since the early 1950s, test reactors, laboratories, hot cells and supporting facilities have been built and operated there. Currently operating on the site are: (1) the Advanced Test Reactor (ATR), which is the world's largest and most advanced test reactor, (2) the ATR Critical Facility reactor, (3) the TRA Hot Cells which process and ship vital isotopes for medicine and industry produced in the ATR, (4) the INEEL Applied Engineering and Development Laboratories and (5) a major industrial machine shop facility that supports not only TRA facilities but also performs support work for all of INEEL. Vital nuclear reactor testing, isotope production and other scientific research are planned to continue until well into the twenty-first century.

TRA Landlord Mission Supporting Goals and Objectives:

- Ensuring an adequate maintenance program is conducted to maintain the site common facilities and utility infrastructure in accordance with DOE, Federal and State of Idaho environmental, safety and health (ES&H) standards and regulations and to ensure reliable program support for tenant programs.

- Ensuring an adequate upgrade construction program is conducted to the site buildings and utility infrastructure to meet programmatic, reliability and ES&H requirements. Most of the TRA Landlord buildings and utility systems are more than 40 years old, and, given the projected indefinite continuing mission of the site, upgrades must be made to the buildings and especially to the utility infrastructure as these facilities and systems are at or near the end of their useful life or do not meet current ES&H requirements.

- Ensuring environmental compliance for the site including identification of legacy waste and mitigation in accordance with DOE, Federal and State of Idaho regulations and specific legal agreements entered into with the State of Idaho.

Planned FY 2000 TRA Landlord accomplishments include: providing construction projects operating support, conducting routine maintenance and repair on common site facilities and utility systems, ensuring site environmental compliance including cleanup of legacy waste, procurement of General Purpose Capital Equipment (GPCE), and conducting General Plant Projects (GPP) and Line Item Construction Projects (LICP). The FY 2000 budget provides for continuation of the LICP to improve fire safety for TRA site to meet current Federal, State and Department of Energy (DOE) fire safety standards. In July, 1998, a malfunctioning CO2 fire suppression system resulted in a fatality and multiple injuries. A Type A investigation was conducted by the Office of Environment, Safety and Health and appropriate actions were taken to ensure such an accident would not occur again. The principal fire safety improvements in FY 2000 will be continuing the process of upgrading fire doors, fire suppression systems, alarm systems, and smoke detectors. The FY 2000 budget provides for continuation of the TRA Electrical Utility Upgrade LICP to reconfigure the 40 year old electrical utility system to meet current needs and to replace aged switchgear, panels and transformers for which maintenance parts are no longer available or which

are at end of useful life and beyond economical repair. The planned GPPs for FY 2000 are to provide upgrades to the TRA Retention Basin, the TRA Evaporation Pond and the TRA Laboratory Radioactive Effluent System.

The TRA Landlord line item has been underfunded for several years. It is important that the Department take action in FY 2000 to address the aging infrastructure of the site to ensure that programmatic, environment, safety and health requirements are met.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Operations and Maintenance	2,914	4,000	6,070	+2,070	+51.8%
Construction	4,425	2,766	2,930	+164	+5.9%
Total, Test Reactor Area Landlord	7,339	6,766	9,000	+2,234	+33.0%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Operations and Maintenance			
# Provide engineering planning, development, design, project validation and construction management for the Fire & Life Safety LICP, the Electrical Utility Upgrade LICP and GPP projects	841	815	950
# Continue required preventive maintenance and necessary routine repair activities to correct site deficiencies identified during facility inspections and assessments to ensure that TRA Landlord facilities are maintained in compliance with programmatic and ES&H requirements	584	472	570
# Continue to procure GPCE to support TRA Landlord requirements	90	140	240
# Conduct GPP such as the TRA Retention Basin Upgrade, the TRA Evaporation Pond Upgrade and the TRA Laboratory Radioactive Effluent System Upgrade	974	1,290	1,110
# Continue environmental compliance legacy waste cleanup activities in accordance with DOE, Federal and State of Idaho regulations and specific agreements with the State of Idaho.	425	1,283	3,200
Total, Operations and Maintenance	2,914	4,000	6,070
Construction			
# Continue the TRA Fire & Life Safety LICP	4,425	2,425	1,500
# Continue the TRA Electrical Utility Upgrade LICP	0	341	1,430
Total, Construction	4,425	2,766	2,930
Total, Test Reactor Area Landlord	7,339	6,766	9,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Operations and Maintenance	
# Construction operating support escalated for inflation and project requirements	+135
# Maintenance and repair increased due to projected work scope	+98
# GPCE increased due to planned requirements	+100
# GPP decreased due to planned requirement.	-180
# Projected requirements for Environmental Compliance increased in FY 2000 due to mandatory legacy waste cleanup activities.	+1,917
Total, Operations and Maintenance	+2070
Construction	
# TRA Fire & Life Safety LICP decreased for next phase of work.	-925
# TRA Electrical Utility Upgrade LICP increased for next phase of work.	+1,089
Total, Construction	+164
Total Funding Change, Test Reactor Area Landlord	+2,234

95-E-201, Fire and Life Safety Improvements, Idaho National Engineering and Environmental Laboratory, Idaho

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

The Office of Nuclear Energy, Science and Technology (NE) directed changes to the Funding Appropriation Profile results in a 24 month schedule increase and Total Project Cost (TPC) increase of $292K.

Activities are progressing based on the approved requirements. The work is being accomplished based on the Conceptual Design documents and developed detail Title II Design packages. The Project has been divided into eleven (11) work package design, construction and close out activities, to allow for administration, control and coordination with the operating Test Reactor located at the Test Reactor Area (TRA) and other interface issues at the TRA facility. This work corrects numerous Life Safety and Fire Protection and Detection deficiencies that were identified within the TRA operational areas, including the Advanced Test Reactor (ATR), that were identified in eight fire safety assessments including the DOE Tiger Team Assessment. The work to correct the deficiencies is to maintain the safety of site operations and ensure public safety is not jeopardized. The activities within the ATR are to maintain the facility within the requirements as defined within the Technical Specification Requirements, Facility Safety Analysis Requirements (TSR/SAR) and other documents that make-up the ATR Safety Authorization basis for operation.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1995 Budget Request *(Preliminary Estimate)*	2Q 1995	1Q 1997	3Q 1995	4Q 2000	21,320	23,630
FY 1996 Budget Request	2Q 1995	1Q 1997	3Q 1995	4Q 2000	15,472	17,002
FY 1997 Budget Request	2Q 1995	1Q 1997	3Q 1995	4Q 2000	15,446	17,011
FY 1998 Budget Request	2Q 1995	1Q 1997	3Q1995	4Q 2000	15,446	17,011
FY 1999 Budget Request	2Q 1995	1Q 1997	3Q1995	4Q 2000	15,446	17,011
FY 2000 Budget Request *(Current Baseline Estimate)*	2Q 1995	4Q 1999	3Q 1996	4Q 2001	15,446	17,322

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1995	$ 867	$ 867	$ 603
1996	693	693	416
1997	25	25	46
1998	175	175	22
1999	45	45	216
2000	12	12	12
Construction			
1995	829	829	577
1996	1,207	1,207	724
1997	975	975	1,773
1998	4,250	4,250	526
1999	2,380	2,380	6,543
2000	1,488	1,488	1,488
2001	2,500	2,500	2,500

3. Project Description, Justification and Scope

Project Description

This project provides for the Design, Procurement, Construction and System Operational testing activities to correct fire and life safety code deficiencies at the TRA. Specific improvements are:

- Modifications to or replacement of deficient fire barriers to meet code and reduce Maximum Possible Fire Loss (MPFL) or smoke damage impacts to personnel and property.

- Additions, modifications, or new automatic fire suppression systems to meet code requirements for operations personnel life safety and to reduce Maximum Credible Fire Loss (MCFL) potentials to acceptable improved risk levels as required by DOE Order 5480.7.

- Additions or modifications to existing building heating and ventilating systems to control fire and smoke spread, smoke detection, upgrades or replacement of interior doors to provide smoke and fire barriers, protection of structural support members, and sealing of penetrations in fire barriers (existing walls and floors) to provide effective control of property damage and life safety protection.

- Modifications and expansion of the fire detection and alarm system and removal of obsolete equipment to meet codes and provide TRA system compatibility with the Idaho National Engineering and Environmental Laboratory (INEEL) wide system.

- Addition of fully redundant water supply, consisting of new Underwriters Laboratories (UL)-listed and Factory Mutual (FM)-approved fire pumps and a tank capable of delivering 100 percent of the highest demand for volume, pressure, and duration, to meet reliability requirements of DOE Order 5480.7.

- Additions or modifications to existing fire water distribution piping, hydrants and valves.

- Upgrades to the site Raw Water Storage Tanks. The tanks are old and have conical steel roofs which have deteriorated to the point that the corrosion is exposing TRA drinking water to rain, biological contamination and ATR Cooling tower exhaust condensate. The tanks require rework to meet the existing TRA seismic qualification requirements. The tanks are designated as the ATR emergency core cooling storage system and are required to be in service and provide for water storage during reactor operations and shutdown modes.

Justification

To upgrade TRA's Fire and Life Safety Systems for compliance with applicable sections of the Code of Federal Regulations (CFR), DOE fire safety requirements, the National Fire Protection Association (NFPA) Codes and Standards including the National Electrical Code (NEC). The need for corrective actions were defined by the INEEL Operating Contractor and by numerous DOE fire safety assessments.

Regulation Drivers

The NFPA Life Safety Codes (NFPA Standard 101), NFPA Fire Protection/Prevention/Detection requirements, the NEC (NFPA Standard 70), Occupational Safety and Health Administration (OSHA) (29 CFR 1910), and DOE Order 5480.7.

National Environmental Policy Act (NEPA) documentation requirements - Finalization of Air Permit Completed in FY98. (As tasks are worked, continual review to ensure that all NEPA requirements are identified and met is accomplished.)

Raw Water Storage Tank System required to meet DOE seismic and water storage requirements.

Radiological Controls

Work is being performed within radiological buffer areas. There is a potential for encountering radioactive contamination. This issue will be handled with applicable radiological surveys, work reviews and zoning of work area accordingly.

Asbestos

Asbestos and asbestos contaminated materials will be encountered on this project. Proper controls, abatement work instructions and disposal methods will be performed in accordance with LMITCO Industrial Hygiene and Environmental requirements in accordance with 29CFR 1926.1101, ASBESTOS.

Lead

Lead painted materials will be encountered on this project. Proper controls, abatement work instructions and disposal methods will be performed in accordance with LMITCO Industrial Hygiene and Environmental requirements in accordance with 29CFR 1926.62, LEAD.

Scope

Tasks initially defined the activities that reflected work areas and the priority of needed corrective actions. The directed funding profile by budget year requires work be sequenced and structured to reflect the available budget funding. The addition of the work defined as tasks required an integration into the phased work schedule of the TRA Fire and Life Safety project. The defined budget profile has required that each phase be evaluated based on the planned reactor operations schedule and FY budget.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design Costs (Design Drawings and Specifications)	1,601	1,601
Design Management Costs (0.2% of TEC)	32	32
Project Management Costs (0.4% of TEC)	68	68
Total, Design and Management Costs (11.0% of TEC)	1,701	1,701
Construction Phase		
Improvements to Land	155	155
Buildings	8,160	8,160
Utilities	3,137	3,137
Standard Equipment	648	648
Construction Management (1.6% of TEC)	251	251
Project management (4.6% of TEC)	711	711
Total, Construction Costs	12,100	12,100
Contingencies (4.4% of TEC)	683	683
Total, Line Item costs (TEC)	15,446	15,446

5. Method of Performance

The Department of Energy Idaho Operations Office (DOE-ID) shall be responsible for implementation of the project, including selection of principal contractors and approval of specified procurement actions. DOE-ID project management shall be performed by the Construction Management Group in the Office of Program Execution. Safety, environmental, and other project support shall be furnished to the project on an as-needed basis by the DOE-ID matrix organization.

The design, project management, and construction management shall be performed under a negotiated contract with the operating contractor. Construction and procurement shall be accomplished by fixed price contracts awarded on the basis of competitive Best Valve bidding process. Inspection may be performed by another agent. Check-out of systems, and maintenance of the completed project shall be performed by the operating contractor.

The INEEL Operating Contractor's (OC) Project Manager shall be responsible for the entire project: design, all construction activities at the TRA/INEEL site, construction subcontracting, direction of the activities of construction subcontractors, and performance and management of construction activities as required to complete the project in a timely, safe, and cost-effective manner.

The Life Safety deficiencies identified have been divided to be work packages (tasks) based on areas and type of work activity to allow for performance under a controlled work plan and the defined priority of the identified deficiencies. The designs are evaluated based on the method of work and area controls. The packages have been developed for subcontracting actions to utilize the available qualified craft within the area to accomplish the needed modifications to correct the life safety and fire protection and detection corrections identified. The work is on going to accomplish the corrections needed At the Test Reactor Area (TRA). The work has been divided into 11 Phases as follows:

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1997	FY 1998	FY 1999	Outyears	Total
Project Cost						
Facility Cost						
Design	1,019	46	22	216	12	1,315
Construction	1,301	1,773	526	6,543	3,988	14,131
Total, Line Item TEC	2,320	1,819	548	6,759	4,000	15,446
Other Project Costs						
Conceptual design costs	350	0	0	0	0	350
NEPA documentation costs	11	11	17	12	2	53
Other project-related costs	302	221	411	259	280	1,473
Total Other Project Costs	663	232	428	271	282	1,876
Total, Project Cost (TPC)	2,983	2,051	976	7,030	4,282	17,322

7. Related Annual Funding Requirements

(FY 2002 dollars in thousands)

	Current Estimate	Previous Estimate
Annual Facility operating costs	1	1
Annual Programmatic operating expenses directly related to the facility	10	10
Total related annual funding	11	11
Total operating costs *(operating from (2002 through FY 2006)*	55	55

99-E-200, Electrical Utility Upgrade, Idaho National Engineering and Environmental Laboratory, Idaho

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

Date construction ends is extended 1 1/4 years from 3rd Quarter FY2002 to 4th Quarter FY2003.

To maintain TEC of $6.7M, scope and construction costs are reduced from $4,328K to $4,043K (total change of $285K) to address escalation and extended project duration costs due to the funding profile changes.

Due to the extended schedule, operating funds to support the project have increased by $240K to $860K, increasing the TPC from $7,320K to $7,560K.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	2Q 1999	3Q 2000	3Q 2000	4Q 2002	6,700	7,320
FY 2000 Budget Request *(Current Baseline Estimate)*	2Q 1999	3Q 2000	4Q 2000	4Q 2003	6,700	7,560

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1999	341	341	341
2000	166	166	166
Construction			
2000	1,264	1,264	318
2001	1,944	1,944	2,890
2002	2,311	2,311	2,311
2003	674	674	674

3. Project Description, Justification and Scope

The Test Reactor Area (TRA) was established in the early 1950's with the development of the Materials Test Reactor. Two other major test reactors followed. The electrical distribution system supplying power to these programs included 13.8kV and 2400 volt equipment. Over the past 40 years, the electrical distribution system has been modified many times to accommodate operating requirements of the users.

The TRA Electrical Utility Upgrade Project provides for the design, procurement, and construction activities to correct specific electrical deficiencies in the 13.8kV and 5kV class equipment at the TRA. The scope addresses:

a) Increased reliability by replacement of 30 to 40 year old switchgear, transformers and panelboards.
b) Modification of the standby power system and elimination of the redundant battery banks and associated equipment.
c) Consolidation and reconfiguration of the electrical distribution system to avoid safety hazards while considering provisions for future expansion.
d) Simplification of switchgear use by utilizing common voltages.) Reconfiguration to allow preparation for demolition of facilities.
e) Abatement of hazards, including electrical shock.

This project proposes to upgrade portions of the TRA electrical distribution system to address deterioration, configuration, load requirements, and standby power requirements. The upgrades will result in a reliable and maintainable electrical distribution system that meets the current and projected needs of tenant programs.

Since the 1950's, when electrical distribution equipment was first being installed at the TRA, numerous modifications to the system have been accomplished. These modifications, while providing immediate solutions to specific problems, did not always address optimum system operation. The cumulative effect of changes over time and the deterioration of the system with age has resulted in decreased reliability and maintainability. Changing user requirements have resulted in potential safety concerns such as overloading of equipment. This project addresses usage, configuration, and deterioration of the electrical system.

The project scope typically includes, but is not limited to replacement of selected switchgear and facility transformers, modifications to electrical services and panels, construction of underground ductbanks, replacement of power cables and control wiring, and modifications to instrumentation and control equipment.

The conceptual design has identified major items of scope, however, these identified items and additional deficiencies identified during studies and design efforts will be prioritized and completed under this project as funding allows.

The requested FY 2000 budget appropriation will be used to complete design activities and start construction activities.

4. Details of Cost Estimate

	(dollars in thousands) Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design Costs (Design Drawings and Specifications)	387	387
Design Management Costs (0.01% of TEC)	8	8
Project Management Costs (0.9% of TEC)	58	58
Total, Design and Management Costs (6.8% of TEC)	453	453
Construction Phase		
Utilities	3,566	3,566
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	278	278
Construction management (7.0% of TEC)	469	469
Project management (11.0% of TEC)	710	710
Total, Construction Costs	3,844	3,844
Contingencies (18.3% of TEC)	1,224	1,224
Total, Line Item costs (TEC)	6,700	6,700

5. Method of Performance

The Department of Energy Idaho Operations Office (DOE-ID) shall be responsible for implementation of the project, including selection of principal contractors and approval of specified procurement actions. DOE-ID project management shall be performed by the Construction Management Group in the Office of Program Execution. Safety, environmental, and other project support shall be furnished to the project on an as-needed basis by the DOE-ID matrix organization.

The design, project management, and construction management shall be performed under a negotiated contract with the operating contractor. Construction and procurement shall be accomplished by fixed price contracts awarded on the basis of competitive bidding. Inspection may be performed by another agent. Check-out of systems, and maintenance of the completed project shall be performed by the operating contractor.

The INEEL operating contractor Project Manager shall be responsible for the entire project: design, all construction activities at the INEEL site, construction subcontracting, direction of the activities of construction subcontractors, and performance and management of construction activities as required to complete the project in a timely, safe, and cost-effective manner.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1999	FY 2000	FY 2001	Outyears	Total
Project cost						
Facility Cost						
Design	0	341	166	0	0	507
Construction	0	0	318	2,890	2,985	6,193
Total, Line item TEC	0	341	484	2,890	2,985	6,700
Other project costs						
Conceptual design costs	94	0	0	0	0	94
NEPA documentation costs	4	0	0	0	0	4
Other project-related costs	84	23	111	118	426	762
Total other project costs	182	23	111	118	426	860
Total, Project Cost (TPC)	182	364	595	3,008	3,411	7,560

7. Related Annual Funding Requirements

(FY 2003 dollars in thousands)

	Current Estimate	Previous Estimate
Total related annual funding	0	0

Nuclear Energy Plant Optimization

Mission Supporting Goals and Objectives

The U.S. has entered a period of change and uncertainty in the electricity sector. With the deregulation of electricity production, many unprecedented issues are challenging utilities, regulators, and the Federal Government. New technologies are altering the fuel choices made by utility planners. Environmental laws are causing the closure of older fossil-fuel plants, and many U.S. nuclear plant owners are approaching a critical decision point as to whether their plants should be shutdown at or before their initial license period, or whether they should apply for a twenty-year extension on that license.

The DOE's Energy Information Administration (EIA) anticipates that, even with aggressive implementation of energy efficiency measures, U.S. electricity consumption will increase 1.4 percent each year through 2020 – the equivalent of building seven large 1000-megawatt power plants every year. During this same period, the EIA projects approximately 127,000 megawatts of existing electricity generating capacity will be retired because of age, competitive pressures, and as part of U.S. utility efforts to meet clear air standards. As a result, the EIA estimates the U.S. must build the equivalent of over 1,000 new fossil fuel generating plants by 2020 to meet growth in demand and offset plant retirements. Building these plants will require a huge economic investment in new baseload generating capacity during the next two decades, and when in operation, these plants will emit large quantities of air emissions.

Continued operation of existing nuclear plants through their original license term and a 20-year renewed license term would delay the need to build more baseload power plants. Existing U.S. nuclear power plants are a vital component of the U.S. energy diversity strategy. Nuclear power plants have operated safely and reliably in the U.S. for decades and are capable of doing so for many decades to come. These plants provide approximately 20 percent of all the electricity generated in the United States. They operate year-round, in all weather conditions without emitting air pollutants.

Environmental issues associated with the burning of fossil fuels, including global climate change, are increasing in importance. To reduce the greenhouse gas (GHG) emissions that contribute to this problem, a comprehensive strategy that combines increased energy efficiency with greater use of nuclear and renewable energy will be required.

Nuclear energy is the only proven large-scale power source that has unlimited potential to provide clean and reliable electricity into the next century. Nuclear power plants do not produce environmentally damaging emissions. As much as 90 percent of the carbon dioxide avoided by U.S. utilities over the last 25 years is attributable to nuclear energy. Continued operation of existing nuclear power plants avoids over 620 million tons of carbon dioxide annually. Nuclear energy's avoidance of greenhouse gas emissions and other pollutants, therefore, is necessary to help the U.S. meet its international commitments to address concerns for global warming.

Globally, nuclear energy is growing in importance as an energy source for expanding economies. U.S. nuclear technology is often the preferred option for countries seeking the best in safety, efficiency, and

economics. U.S. leadership in these markets has been of great strategic importance to the United States, because it provides this nation with a prime seat at the table with other countries as they explore and implement nuclear power technologies. This presence has enabled the U.S. to exercise great international leadership in areas such as nuclear safety, non-proliferation, trade, and the environment.

The U.S. is at a critical juncture with regard to the continued operation of its nuclear power plants. Licenses for U.S. nuclear power plants will begin to expire in large numbers in 2010; licenses for 13 plants representing some 11,700 MWe will expire in 2014 alone. Faced with regulatory, and economic uncertainties, some utilities already have exercised their option to close nuclear facilities well before their license expiration date. This trend has resulted in the premature closing of 6 reactors, a loss of approximately 4,000 megawatts of U.S. generating capacity, in the past four years. Unless reversed by critical near-term action, this trend is expected to continue and could potentially accelerate as the uncertainties of deregulation come into play.

The President's Committee of Advisors on Science and Technology (PCAST) Panel on Federal Energy R&D identified the critical role of nuclear power in its report of November 5, 1997. The Panel's report recommended that the Department work with its laboratories and industry to develop a program to address the problems that may prevent the continued operation of existing nuclear power plants.

Recognizing the broad national strategic interests served by nuclear power and consistent with the Comprehensive National Energy Strategy, the Department proposes a new Nuclear Energy Plant Optimization (NEPO) program starting in FY 2000 in response to the recommendations of PCAST. The Department, national laboratories, and the electric utility industry's Electric Power Research Institute (EPRI) developed the Joint DOE-EPRI Strategic Research and Development Plan to Optimize U.S. Nuclear Power Plants. This report, issued March 20,1998, utilized input from the national laboratories, NRC, and other key stakeholders. The purpose of this Strategic Plan, which will be updated in FY 1999, is to help the federal government and private sector jointly identify, prioritize, and execute the essential peer-reviewed R&D needed over the next 10 to 12 years to sustain operation of existing nuclear power plants, based on strategic national goals that both industry and government endorse. The work performed in this program will be prioritized by the Nuclear Energy Research Advisory Committee (NERAC) Subcommittee on Operating Nuclear Power Plant Research, Coordination and Planning. NERAC will also guide the application of peer review and the competitive selection of performers.

The goal of the NEPO program is to ensure that current nuclear plants can continue to deliver adequate and affordable energy supplies up to and beyond their initial 40-year license period by resolving open issues related to plant aging, and by applying new technologies to improve plant economics, reliability, and availability.

The objectives related to this goal are:

- Managing long-term effects of component aging: Component and structure material degradation occurs in nuclear plants as a result of long-term operation and exposure of materials to harsh environmental conditions. R&D conducted under NEPO will provide a better understanding of degradation mechanisms and how they occur, enabling development of cost-effective aging management strategies which will provide capabilities to easily prevent, detect or repair the degradation.

- Improving nuclear power plant capacity factors: This objective focuses on improving the long-term economic performance of current plants through development of technologies that will improve equipment reliability, lower operating costs, and increase power output while maintaining high levels of safety.

- Generation optimization through efficiency and productivity improvements: Current nuclear plants were designed and are operating with technology developed over twenty-five years ago. As these nuclear plants age, components and parts degrade or become obsolete, introducing inefficiencies, added costs, and unreliability. There have been significant technology advancements over the past twenty-five years that are applicable to power generation, particularly in computers, communications, materials, sensors and digital electronics, and artificial intelligence, providing more accurate, reliable and cost-effective technologies. Further research and technology developments will produce new technology applications that will make nuclear plant operation and maintenance processes more economical and increase overall plant output. Demonstrations of technology performance will be an integral part of this R&D effort in order to achieve regulatory acceptance of these new technologies.

The R&D performed by the nuclear industry - totaling approximately $100 million each year - is critical to the maintenance of safe and economic operation of U.S. nuclear power plants. However, the nuclear industry's primary interest is to invest the bulk of its R&D spending on short-term payback, low-risk activities that are needed to enhance day-to-day operational performance and safety. DOE's role in nuclear energy R&D is the same as in other areas of DOE energy research: to address the difficult technology issues that it is better equipped to solve than industry--because of the unique facilities and capabilities available to DOE, the lack of market incentive for industry to develop technologies important to the national interest, or because of the long-term and/or high-risk nature of the research.

The Department and the Nuclear Regulatory Commission (NRC) have established close coordination in research program planning to assure that the work performed by each organization is complementary to the other, cost-effective, and without duplication. The role of the NRC is very different from that of DOE. DOE's role is to develop technologies to address operational issues at nuclear power plants. NRC's role is to assure that it can provide the public with independent assurance that the technologies developed by DOE or industry for use in nuclear power plants are safe. NRC conducts confirmatory research as part of its responsibility to develop rules or regulations for use of new technology in nuclear

power plants. Although DOE's proposed R&D includes areas in which NRC has ongoing programs, the focuses of the two programs are distinct. Finally, to assure that NRC and DOE remain fully coordinated in all aspects of their research programs, the Department has invited the NRC to select a high-level representative to serve as an ex-officio member of the NERAC.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Nuclear Energy Plant Optimization	0	0	5,000	+ 5,000	+100.0%
Total, Nuclear Energy Plant Optimization	0	0	5,000	+ 5,000	+100.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Nuclear Energy Plant Optimization			
# NEPO is proposed as a new program to address problems that will likely prevent the continued operation of many existing nuclear power plants. Funds provided by DOE will be matched by industry in conducting the proposed peer-reviewed R&D to include: managing long-term effects of component aging; improving nuclear power plant capacity factors; and generation optimization through efficiency and productivity improvements.	0	0	5,000
Total, Nuclear Energy Plant Optimization	0	0	5,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Nuclear Energy Plant Optimization	
# The NEPO Program is a new program for FY 2000 to conduct innovative nuclear energy R&D as recommended by the PCAST Panel on Federal Energy Research and development. Matching funds are to be provided by industry. The activities funded under NEPO will be based on the critical R&D needs defined in the Joint DOE-EPRI Strategic R&D Plan to Optimize U.S. Nuclear Power Plants	+ 5,000
Total Funding Change, Nuclear Energy Plant Optimization	+ 5,000

Nuclear Energy Research Initiative

Mission Supporting Goals and Objectives

The Nuclear Energy Research Initiative (NERI) involves the research and development of new technologies to address the key issues affecting the future of nuclear energy, in particular, proliferation resistant reactors and fuel cycles; new reactor designs with higher efficiency, lower cost, and improved safety to compete in the global market; low output reactors; and new techniques for on-site and surface storage and permanent disposal of nuclear waste. [a]

A primary mission of the Department of Energy is to help assure that the United States maintains a flexible and diverse portfolio of energy supply options to power economic growth and enhance the quality of life for the American people. Nuclear energy currently provides about 20 percent of U.S. electricity generation and can contribute a significant portion of U.S. electrical energy production for many years to come. As we now enter a new millennium, the Nation faces new issues associated with energy supply and environmental policy. The potential role of nuclear power to address these new challenges, such as global climate change, will depend upon the ability of the Federal government, universities, national laboratories, industry, and others to pool their talents and creatively address the key challenges affecting the future of nuclear energy. This was clearly articulated in the President's Committee of Advisors on Science and Technology (PCAST) Panel's November 5, 1997, report to the President on Federal Energy Research and Development.

The United States has always been the world leader in both the policy and technical aspects of nuclear energy. The United States has more nuclear power plants in operation today than any other nation and most of the world's operating nuclear power plants are based on U.S. light water reactor technology. U.S. nuclear power plant technology has been exported and adapted for use in France, Japan, South Korea, and many other countries. Many countries, particularly the fast-growing economies in Asia, are interested in building new plants based on U.S. designs. Given the projected growth in global energy demand as developing nations industrialize; our vital strategic interests in addressing global climate change, nuclear non-proliferation, nuclear safety, and economic competitiveness; and our need to satisfy growing domestic needs for energy in an environmentally responsible manner, the United States must maintain its scientific and technological leadership in nuclear energy. This leadership provides the U.S. a "seat at the table" when it comes to negotiation of policy issues related to non-proliferation and related topics.

While nuclear power presents significant environmental and other benefits, several important issues impede nuclear energy's future--among these are issues related to the disposal of nuclear waste; international concerns about nuclear materials proliferation; public concerns about safety, and nuclear power's problematic economic record in the United States. Industry and government share in the

[a] As noted in the "Federal Energy Research And Development For The Challenges Of The Twenty-First Century" Report of the Energy Research and Development Panel, The President's Committee of Advisors on Science and Technology (PCAST), November 1997

responsibility for these problems and it is in the long-term strategic interests of the Nation that they be addressed and resolved. In particular, because no new nuclear power plants are expected to be built in this country for at least another decade, it is important that the government take appropriate action both to address key issues and to maintain a viable technology infrastructure in the United States. To date, current trends in industry, government, and universities are in contrast with the vital strategic needs of the Nation:

- Because of the lack of near-term economic incentives to conduct long-term research, U.S. industry's support of advanced nuclear research continues to shrink;

- University nuclear engineering and research programs face severe challenges and reduced funding, paralleling the reduced outlook for nuclear energy-related jobs in industry; and

- The role of the Federal Government in nuclear energy research has already changed--the funding for the Department's nuclear energy research activities has been sharply reduced in recent years.

Recognizing the important national need to address these issues, the PCAST Panel on Federal Energy Research and Development determined that establishing nuclear energy as a viable and expandable option was important, and recommended that the Department establish a new nuclear energy research program to address the problems of nuclear waste, proliferation, safety and economics. Specifically, the PCAST panel recommended the Department initiate a new nuclear energy research initiative based on competitive selection of research proposals from the national laboratories, universities and industry to "address the key issues affecting the future of fission energy including: proliferation-resistant reactors or fuel cycles; new reactor designs with higher efficiency, lower-cost, and improved safety to compete in the global market; lower output reactors for use where large reactors are not attractive; and new techniques for on-site and surface storage and for permanent disposal of nuclear waste.".

The Department endorsed this recommendation and proposed the creation of the NERI in FY 1999. To achieve this goal, the following objectives have been established for NERI:

- Develop advanced concepts and scientific breakthroughs in nuclear fission and reactor technology to address and overcome the principal technical and scientific obstacles to the expanded use of nuclear energy in the U.S. including issues involving nuclear proliferation, unfavorable economics, and nuclear waste disposition;

- Advance the state of nuclear technology to maintain a competitive position in overseas markets and a future domestic market;

- Promote and maintain a nuclear science and engineering infrastructure to meet future technical challenges; and

- Improve performance, efficiency, reliability, and economics to enhance nuclear energy application.

NERI will feature a competitive, investigator-initiated, peer-reviewed selection process to fund innovative nuclear energy-related research at universities, national laboratories, and industry. The

Department believes that by funding creative research ideas at the Nation's science and technology institutions and companies, the United States will find new solutions to issues such as nuclear safety, power plant economics, proliferation, and nuclear waste. NERI program funding will be utilized to fund both the research and development activities and the independent merit review (peer review) to evaluate the scientific and technical merit of the proposals submitted.

Scientific and engineering research requested in the FY 1999 program solicitation reflects stakeholder input from universities, national laboratories, and industry resulting from a major workshop with over 126 participants held in Washington, D.C. on April 22-23, 1998. In addition, the Office of Nuclear Energy, Science and Technology works closely with the Office of Science in both the implementation of NERI and peer review to ensure that the program is implemented consistent with recommendations of PCAST, and peer reviewed consistent with the Office of Science process.

This research initiative will be managed by the Department's Office of Nuclear Energy, Science and Technology with external oversight provided on a periodic basis by the Nuclear Energy Research Advisory Committee (NERAC) to guide the strategic focus of research. The Department will continue to encourage joint research and development activities among universities, national laboratories, and industry; as well as the involvement of foreign research organizations. The Department will solicit proposals from the scientific and technical community for research that is relevant to addressing the vital issues facing nuclear energy. NERI will include an independent peer review process to evaluate and select specific research proposals to ensure the scientific and technical merit and relevancy of the research. NERI activities will continue to be coordinated with other relevant DOE program offices to assure that the best use is made of the Department's financial, intellectual, and physical resources.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Nuclear Energy Research Initiative [a]	0	19,000	25,000	+6,000	+31.6%
Total, Nuclear Energy Research Initiative	0	19,000	25,000	+6,000	+31.6%

[a] NERI is a new program in FY 1999 that is in the solicitation phase as this document is being prepared; therefore the research activities cannot be specified.

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Nuclear Energy Research Initiative			
# Continue the NERI program which was initiated in FY 1999 to stimulate innovative research to address the difficult issues that compromise nuclear energy's potential as a viable and expandable future electricity option. DOE proposed the NERI program to encourage innovation and foster new ideas from our nation's leading researchers at universities, national laboratories and industry to address the issues of proliferation, nuclear waste, reactor safety and nuclear plant economics. Resolution of these issues through a successful NERI program will help to make nuclear energy a viable electricity option for the next century. Given the projected growth in global energy demand as developing nations industrialize, and the desire to reduce regional and global air pollution, it is vitally important to achieve this objective. The FY 1999 NERI solicitation requested research proposals with periods of performance up to 3 years, the first year to be funded with FY 1999 appropriations and the second year with FY 2000 appropriations. Hence, a substantial portion of the requested $25 million will be used to continue research proposals awarded in FY 1999. Approximately $6 million will be available for new research proposals under a FY 2000 solicitation.	0	19,000	25,000
Total, Nuclear Energy Research Initiative	0	19,000	25,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Nuclear Energy Research Initiative	
# Continue in FY 2000 the nuclear energy research programs initiated in FY 1999 and make available approximately $6 million for new research	+6,000
Total Funding Change, Nuclear Energy Research Initiative	+ 6,000

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Capital Equipment	2,929	2,540	2,250	-290	-11.4%
General Plant Projects	2,796	1,990	1,110	-880	-44.2%
Total, Capital Operating Expenses	5,725	4,530	3,360	-1,170	-25.8%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998 Request	FY 1999 Approp.	FY 2000 Approp.	Unapprop. Balance
95-E-20, TRA Fire and Life Safety Improvements, INEEL	15,446	4,596	4,425	2,425	1,500	2,500
99-E-200, TRA Electrical Utility Upgrade	6,700	0	0	341	1,430	4,929
Total, Construction		4,596	4,425	2,766	2,930	7,429

Termination Costs

Program Mission

The Termination Costs Program is a key component of the Department's energy supply and research missions and is directed at:

- Ensuring the cost-effective, environmentally-compliant operation of Office of Nuclear Energy, Science and Technology (NE) sites and facilities;

- Maintaining the physical and technical infrastructure necessary to support research and technology development by U.S. and overseas researchers;

- Demonstrating the acceptability of electrometallurgical technology for preparing DOE spent nuclear fuel for ultimate disposal; and

- Placing unneeded facilities in industrially safe and environmentally compliant conditions for low-cost, long-term surveillance.

Termination Costs supports the DOE Strategic Plan and the FY 2000 Performance Plan as follows:

- *Environmental Quality Objective 6* - Reduce life-cycle costs of environmental cleanup.

  - FY 2000 Strategy - The Department will reduce operating costs by continuing deactivation of surplus nuclear facilities and placing them in a radiologically and industrially safe shutdown condition. The Department will also demonstrate the viability of electrometallurgical technology for application to DOE spent nuclear fuel management needs.

Program Goal

- To contribute to the nation’s nuclear science and technology infrastructure through the development of innovative technologies for spent fuel storage and disposal and the effective management of active and surplus nuclear research facilities.

Program Objectives

- Demonstrate the viability of electrometallurgical technology and the resulting waste forms for application to DOE spent nuclear fuel management needs, including the preparation of EBR-II and other DOE sodium-bonded spent nuclear fuel for disposition in a geological repository. *(Program Objective 1)*

- Place the EBR-II and other surplus facilities at the Argonne National Laboratory-West (ANL-West) site near Idaho Falls, Idaho in a radiologically and industrially safe shutdown condition for low-cost, long-term surveillance and maintenance. *(Program Objective 2)*

- Maintain ANL-West site safety, security, and safeguards infrastructure and ensure all nuclear materials are secure and handled safely in a manner which protects workers, the public, and the environment. *(Program Objective 3)*

- Maintain the ANL-West site waste management and technology development support needed to meet the Department's commitments to the State of Idaho. *(Program Objective 4)*

Performance Measures

- Complete the demonstration of the electrometallurgical spent fuel treatment technology by the end of FY 1999 using Experimental Breeder Reactor-II spent nuclear fuel. *(Performance Measure supports Program Objective 1)*

- Complete the conversion and disposition of 100 percent of the secondary sodium coolant from the Experimental Breeder Reactor-II and 40 percent of the Fermi reactor sodium coolant in storage at Argonne National Laboratory-West. *(Performance Measure supports Program Objective 2)*

- Determine by September 1999 whether electrometallurgical waste forms perform better than borosilicate glass under conditions consistent with the requirements being developed for the Department's geological repository license application. *(Performance Measure supports Program Objective 1)*

- In FY 2000, complete the draining and processing of EBR-II primary sodium. *(Performance Measure supports Program Objective 2)*

- In FY 2000, complete a National Environmental Policy Act review on the use of electrometallurgical technology to treat EBR-II and other sodium-bonded fuel in the Department's spent fuel inventory. *(Performance Measure supports Program Objective 4)*

- In FY 2000, complete documentation of the operational phase of the demonstration project and resulting data from the electrometallurgical technology demonstration. *(Performance Measure supports Program Objective 1)*

- Develop technical basis to support a DOE decision in FY 2000 on future application of the electrometallurgical treatment technology in the disposition of DOE spent nuclear fuels. *(Performance Measure supports Program Objective 4)*

- In FY 2000, develop preliminary cost estimates and schedules for deactivating the Fuel Conditioning Facility and the Sodium Processing Facility. *(Performance Measure supports Program Objective 2)*

Significant Accomplishments And Program Shifts

- Demonstration of the electrometallurgical technology for treatment of sodium-bonded EBR-II fuel and blanket assemblies was initiated in June 1996.

- EBR-II defueling was completed in December 1996.

- In FY 1997, an Environmental Assessment and Finding of No Significant Impact were issued for the shutdown of the EBR-II, including the conversion of the sodium coolant to an environmentally acceptable form suitable for disposal.

- In FY 1998, modifications to the Sodium Process Facility were completed to enable processing of legacy Fermi reactor sodium and EBR-II sodium into a waste form suitable for disposal.

- In FY 1999, complete the draining and processing of the 17,000 gallons of sodium coolant from the EBR-II secondary heat transport system.

- In FY 1999, complete the operational phase of the electrometallurgical treatment technology demonstration project.

- In FY 2000, complete a National Environmental Policy Act review and issue a Department decision on the use of the electrometallurgical technology to treat the remaining inventory of EBR-II spent fuel and other DOE sodium-bonded spent fuel.

- In FY 2000, complete all sodium coolant processing at ANL-West.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Termination Costs					
Termination Costs	88,149 [a]	85,000	0	85,000	65,000
Total, Termination Costs	88,149 [a]	85,000	0	85,000	65,000

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chicago Operations Office					
Argonne National Laboratory	87,135	85,000	65,000	-20,000	-23.5%
Chicago Operations Office	158	0	0	0	0.0%
Total, Chicago Operations Office	87,293	85,000	65,000	-20,000	-23.5%
Oakland Operations Office	120	0	0	0	0.0%
Oak Ridge Operations Office	20	0	0	0	0.0%
All Other Sites	716	0	0	0	0.0%
Total, Termination Costs	88,149 [b]	85,000	65,000	-20,000	-23.5%

[a] Includes $12 million appropriated for Nuclear Technology R&D under Other Defense Activities.

[b] Includes $12 million appropriated for Nuclear Technology R&D under Other Defense Activities.

Site Description

Argonne National Laboratory

Argonne National Laboratory (ANL) is one of the U.S. Department of Energy's largest research centers. It is also the nation's first national laboratory, chartered in 1946. Argonne National Laboratory is located at two sites. The Illinois site, ANL-East, is the main laboratory and occupies 1500 acres, surrounded by a forest preserve about 25 miles southwest of Chicago's Loop. The Idaho site, ANL-West, occupies about 900 acres on the Idaho National Engineering & Environmental Laboratory site, about 35 miles west of Idaho Falls in Southeastern Idaho's Snake River Valley.

Typically, basic research is conducted at the ANL-East laboratory near Chicago, with large-scale testing and development conducted at the Idaho site, ANL-West. For example, experiments, modeling and analyses at ANL-East developed the electrometallurgical technology that is now being demonstrated with spent nuclear fuel at ANL-West. The capabilities of ANL-West also include nuclear fuel development, post-irradiation examinations, waste and nuclear material characterization, and development of dry, interim storage for spent fuel and other materials.

Activities under the Termination Costs program use a number of significant facilities at ANL-West, including the Hot Fuels Examination Facility (HFEF), Fuel Conditioning Facility (FCF), Fuel Manufacturing Facility (FMF), Sodium Process Facility (SPF), and Radioactive Scrap and Waste Facility (RSWF).

The HFEF is a versatile modern hot cell facility that is operated to characterize and package spent fuel and radioactive waste, including high-level waste which could ultimately be placed in a geologic repository. The FCF is being used to demonstrate the electrometallurgical treatment technology on spent fuel removed from the Experimental Breeder Reactor-II (EBR-II), a research reactor at ANL-West that is being deactivated. The FMF is currently being used to develop and test fuel for research reactors, and to verify suitability of waste forms that would result from electrometallurgical treatment. The SPF is being used to convert the legacy sodium from the Fermi reactor in Michigan which is stored at ANL-West and the sodium coolant from EBR-II into a chemically stable, low-level waste form. The RSWF provides a fully permitted interim storage capability for a wide variety of experimental spent fuels and radioactive scrap. Other facilities at ANL-West, such as the Zero Power Physics Reactor and the Transient Reactor Test Facility, while not currently operating, provide a number of reactor physics, core design, nuclear materials, and waste treatment testing capabilities.

Termination Costs

Mission Supporting Goals and Objectives

Activities at ANL have four principal goals that support accomplishment of the overall mission of the Termination Costs program. These are:

- Deactivate unneeded facilities, including the EBR-II, and secure them in a radiologically and industrially safe shutdown condition for low-cost, long-term surveillance and maintenance.

- Ensure that the site is maintained in a safe and environmentally compliant manner, that Departmental assets are available as needed to support national objectives, and that all nuclear materials are appropriately stored and safeguarded.

- Conduct advanced research and development in the area of the treatment of DOE spent nuclear fuels using electrometallurgical methods. (formerly Nuclear Technology R&D)

- Complete analysis of the data resulting from the electrometallurgical technology demonstration project, support the National Environmental Policy Act review of electrometallurgical technology for spent fuel disposition, and implement the resulting Record of Decision.

In addition to deactivation activities, Termination Costs program includes activities formerly funded under the Nuclear Technology R&D Program. These activities support the Department's mission to manage approximately 2,700 metric tons of spent nuclear fuel currently in its inventory. These activities could reduce life-cycle costs by developing and deploying an innovative spent fuel treatment technology to solve currently intractable problems. Efforts in this area are important to the Department's strategic environmental quality goal to aggressively address the legacy of civilian nuclear research and development programs, minimize waste volumes, safely manage nuclear materials, and permanently dispose of the Department's radioactive wastes.

The challenge of effectively managing the large inventory of DOE spent nuclear fuel is greatly complicated by the fact that it consists of about 150 different fuel types. Some of these spent fuels present special problems, (*e.g.*, the presence of hazardous materials such as sodium). Other spent fuels are damaged, such as the core debris from Three Mile Island unit 2. Spent fuel with these characteristics may not be acceptable for disposal in current form in a geologic repository and therefore must be treated. A prime example of this type of challenge is the EBR-II spent fuel at the ANL-West site. The EBR-II spent fuel is a metal fuel form containing elemental sodium as a bonding agent. Sodium metal is highly reactive; it burns in air and can explode when exposed to water. Because the sodium is partially absorbed by the uranium fuel elements, mechanical means are not fully effective in removing sodium. Therefore, the Department plans to treat this fuel to create a waste form acceptable for disposal. Currently, the only treatment process that the Department has found that can adequately remove the sodium from EBR-II spent fuel is the electrometallurgical treatment technology developed by ANL. In FY 1996, the Department completed an environmental assessment for the demonstration of electrometallurgical technology to treat EBR-II fuel and blanket assemblies. This demonstration project, limited to 125 EBR-

II driver and blanket assemblies, is being conducted at ANL-West and is scheduled for completion in FY 1999.

Under the Nuclear Technology R&D program, ANL-East conducted electrometallurgical treatment R&D to support the timely completion and accurate assessment of the EBR-II spent fuel treatment demonstration project at ANL-West. In addition to direct analytical support to demonstration operations, limited R&D efforts were directed at increasing the understanding and managing the remaining technical challenges of applying the electrometallurgical technology to spent nuclear fuel. Waste form fabrication and performance results from the demonstration project will be used by the Department in evaluating this technology for application to other DOE-owned spent fuel. The electrometallurgical treatment technology is not being developed to address commercial spent fuel.

A National Academy of Sciences (NAS) panel, working through the National Research Council, has been providing an ongoing independent evaluation of the development of electrometallurgical technology and the demonstration project. Based on their reviews, the Academy supports completion of the electrometallurgical technology demonstration project and the subsequent analysis of the laboratory results. The NAS is currently scheduled to issue a final report on the electrometallurgical technology in December 1999. The NAS review is crucial to the Department's assessment of the demonstration project and any decision to proceed with further application of electrometallurgical technology to the remaining inventory of EBR-II spent fuel and other sodium-bonded fuel.

The FY 2000 budget request provides funding to develop and test waste stream treatment process equipment of a scale suitable for spent fuel inventory treatment, conduct long-term tests to characterize performance of reference waste forms in accordance with established testing protocol, and develop waste form qualification plans and modeling which can be used to gain Nuclear Regulatory Commission approval for emplacement of metal and ceramic waste forms in a geologic repository.

After completion of the operational phase of the electrometallurgical demonstration project, the Department will evaluate the suitability of the technology for full-scale treatment of the remaining inventory of EBR-II spent fuel. The Department's decision to proceed with electrometallurgical processing will be based, in part, on the results from the National Academy of Sciences' review, as well as the completion of an Environmental Impact Statement. Thus, the FY 2000 budget request provides limited funding for the application of electrometallurgical technology since full-scale processing of EBR-II spent fuel will not commence immediately after completion of the demonstration project.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
ANL-West Infrastructure	39,114	37,000	36,000	-1,000	-2.7%
Facility Termination Activities	49,035	48,000	19,000	-29,000	-60.4%
Technology Activities	0	0	10,000	+10,000	+100.0%
Total, Termination Costs	88,149 [a]	85,000	65,000	-20,000	-23.5%

[a] Includes $12 million appropriated for Nuclear Technology R&D under Other Defense Activities.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
ANL-West Infrastructure			
# Site facility and utility maintenance for water, electricity, steam, fire protection, and communications.	13,600	13,300	13,200
# Radiation protection, environmental compliance, and industrial safety	6,000	5,900	5,400
# Site utilities and facility systems engineering and technical support.	6,000	5,900	5,700
# Services and administration costs for human resources, procurement, office support, and warehousing	8,814	7,400	7,050
# Security investigations for obtaining and maintaining security clearances	0	0	150
# Safeguards and security for site and storage of spent fuel and special nuclear materials	4,700	4,500	4,500
Total, ANL-West Infrastructure	39,114	37,000	36,000
Facility Termination Activities			
# Electrometallurgical technology R&D for non-sodium bonded fuel	3,035	0	0
# Electrometallurgical demonstration project and sodium-bonded fuel treatment R&D	40,000	40,000	0
# Sodium processing of EBR-II and Fermi sodium	4,000	5,600	3,400
# EBR-II shutdown and deactivation activities	2,000	2,400	4,200
# Maintain FCF to allow for continuation of electrometallurgical treatment of remaining EBR-II fuel or deactivation of FCF (contingent on NEPA review)	0	0	10,700
# Repackage and remove DOE legacy spent nuclear fuel from a fuel development program from Babcock & Wilcox	0	0	700
Total, Facility Termination Activities	49,035	48,000	19,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Technology Activities			
# Develop and test waste stream treatment process equipment of a scale suitable for spent fuel inventory treatment. Conduct long-term tests to characterize performance of reference waste forms in accordance with established testing protocol, and develop waste form qualification plans and modeling which can be used to gain Nuclear Regulatory Commission approval for emplacement of metal and ceramic waste forms in a geologic repository	0	0	10,000
Total, Termination Costs	88,149 [a]	85,000	65,000

[a] Includes $12 million appropriated for Nuclear Technology R&D under Other Defense Activities.

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
ANL-West Infrastructure	
# The slight reduction in infrastructure costs reflects a renewed effort on the part of the Department and the Laboratory to minimize overhead costs	-1,000
Facilities Termination Activities	
# The Department's decision to proceed with electrometallurgical processing will be based, in part, on the results from the National Academy of Sciences' review, as well as the completion of an Environmental Impact Statement. The FY 2000 budget request provides limited funding for the application of electrometallurgical technology since full-scale processing of EBR-II spent fuel will not commence immediately after completion of the demonstration project.	-29,000
Technology Activities	
# The increase in the technology activities reflects a transition from research in spent fuel treatment technologies to the development and testing of process equipment on a scale suitable for implementation in a spent fuel treatment project. In addition, long-term tests to characterize performance of reference waste forms in accordance with established testing protocol will be conducted, and waste form qualification plans and computer modeling for used in obtaining Nuclear Regulatory Commission approval for emplacement of metal and ceramic waste forms in a geologic repository will be developed	+10,000
Total Funding Change, Termination Costs	-20,000

Fast Flux Test Facility

Program Mission

The Fast Flux Test Facility (FFTF) program provides for the safe and cost-effective maintenance of the FFTF. The FFTF was placed on standby in 1993 after the Department determined that it had sufficient research reactor capabilities to carry out its missions. However, since that time, the Department has terminated one major research reactor project and shutdown three of its operating research reactors. As a result, the Department is considering whether to propose the operation of the FFTF to meet various national isotope production and research needs. The Secretary has indicated that a decision will be made during the Spring of 1999 as to whether to initiate an Environmental Impact Statement to analyze the potential restart of the FFTF, or to proceed with the facility's permanent deactivation.

The Fast Flux Test Facility program supports the DOE Strategic Plan and the FY 2000 Performance Plan as follows:

Environmental Quality Objective 6 - Reduce life-cycle costs of environmental cleanup.

- FY 2000 Strategy - The Department will reduce operating costs by continuing deactivation of surplus nuclear facilities and placing them in a radiologically and industrially safe shutdown condition. At the requested budget level, some plant systems required for operation would be permitted to fail.

Program Goal

To support implementation of the Secretary's anticipated Spring of 1999 decision regarding future operation of FFTF. The Department is considering whether FFTF, which is located at the Hanford site near Richland, Washington, should be used for the future production of medical and industrial radioisotopes and other nuclear research and irradiation activities. If the Department decides that FFTF is not needed for any future mission, the facility will be permanently deactivated.

Program Objective

To maintain FFTF and the adjacent Fuels and Materials Examination Facility (FMEF) in a safe standby condition pending an April 1999 decision by the Secretary of Energy to: restart the facilities for medical isotope production, nuclear research, and other irradiation purposes; resume deactivation of the facilities; or maintain the facilities in standby for potential future use.

Performance Measures

Maintain the Fast Flux Test Facility in a safe, environmentally-compliant standby condition to permit implementation of an anticipated Secretarial decision in FY 1999 to deactivate or pursue potential restart to support a range of national research reactor requirements.

In FY 2000, meet all Federal and State safety and environmental requirements for the Fast Flux Test Facility while implementing a Secretarial decision on the Facility.

Significant Accomplishments And Program Shifts

In FY 1997, completed the construction of a RCRA-compliant Sodium Storage Facility to safely store the sodium coolant from FFTF primary and secondary heat transport systems.

In FY 1997, a Secretarial decision was made to maintain FFTF in standby condition and to evaluate the tritium and medical isotope production capabilities of the facility.

In December 1998, a Secretarial decision was made to not use FFTF for tritium production and to make a decision on any future missions for the facility by April 1999.

S In the Spring of 1999, the Department will decide whether to terminate the FFTF or restart it to support a range of national research reactor requirements. The FY 2000 request would fund minimum surveillance and maintenance of the FFTF to keep it in a safe and environmentally-compliant condition. The FY 2000 request is adequate to support minimum surveillance and maintenance of the facility, however funding above the FY 2000 request level would be required to restart, permanently shutdown, or maintain the facility in its current condition.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Fast Flux Test Facility (FFTF)					
Fast Flux Test Facility (FFTF)	0 [a]	30,000 [b]	0	30,000	30,000
Total, Fast Flux Test Facility Program . . .	0 [a]	30,000 [b]	0	30,000	30,000

[a] $41.7 million included in the Nuclear Materials and Facilities Stabilization budget for the Office of Environmental Management. $9.2 million of this was reprogrammed from Uranium Programs for deactivation activities at FFTF in FY 1999.

[b] Excludes $9.2 million of prior year balances reprogrammed into this account in FY 1998.

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Richland Operations Office					
Fluor Daniel Hanford	0 [a]	30,000 [b]	30,000	0	0.0%
Total, Fast Flux Test Facility	0 [a]	30,000 [b]	30,000	0	0.0%

Site Description

Hanford Site

The FFTF, located at the Department's Hanford Site, near Richland, Washington, is a U.S. Government-owned 400 megawatt-thermal sodium-cooled, fast-neutron flux reactor originally intended for irradiation testing of nuclear reactor fuels and materials for the U.S. liquid metal reactor (LMR) program. The FFTF is the largest and most modern facility of its kind in the world.

The design, operation, and maintenance of FFTF was conducted in accordance with the standards established by the Office of Reactor Development and Technology (RDT) and the American National Standards Institute (ANSI), and the codes established by the American Society of Mechanical Engineers (ASME). An independent safety review of the design and construction of FFTF was conducted by the U.S. Nuclear Regulatory Commission (NRC) at the request of the Energy Research and Development Administration. The objective of the safety review was "to provide an in-depth technical review of the design of the FFTF comparable to that of a licensed plant." The NRC safety review was directed at "evaluating the adequacy of the design to ensure safe operation of the plant" and resulted in the issuance of a Safety Evaluation Report in August 1978.

The FFTF is an array of buildings and equipment arranged around a reactor containment building. The reactor vessel is located in a shielded cell in the center of the containment. Heat is removed from the reactor vessel by liquid sodium circulated through three primary loops (including primary pumps, piping and intermediate heat exchangers) also located in cells in containment. Secondary sodium coolant loops transport the reactor heat from the intermediate heat exchangers to the air-cooled tubes of the dump heat exchangers.

The FFTF includes facilities for receiving, conditioning, storing, installing and removing from the core all routinely replaced core components, and storing irradiated fuel. Post-irradiation examination and packaging capabilities are also available. Utilities and services at FFTF include onsite emergency

[a] $41.7 million included in the Nuclear Materials and Facilities Stabilization budget for the Office of Environmental Management. $9.2 million of this was reprogrammed from Uranium Programs for deactivation activities at FFTF in FY 1999.

[b] Excludes $9.2 million of prior year balances reprogrammed into this account in FY 1998.

generation of electrical power, heating and ventilation, radiation monitoring, fire protection, auxiliary cooling systems for cell atmospheres and some components.

The FFTF is in standby with the reactor completely defueled. The main heat transport system is being operated at approximately 400°F. Essential systems, staffing, and support services are being maintained. Standby surveillance and maintenance activities are being performed to ensure that there is: (1) no degradation of key plant systems; (2) retention of the authorization basis and configuration control; (3) maintenance of key staffing, qualifications, and training; and (4) full compliance with Federal and state safety and environmental requirements.

The FFTF was operated from April 1982 to April 1992 in support of various Department programs such as material testing for fusion, space reactor, and international fast reactor programs. The facility played a key role in LMR development and testing activities as it provided a test bed for demonstrating and evaluating the performance of fuel assembly and core designs in a prototypic LMR environment. The FFTF is widely considered the Department's best nuclear facility in terms of conduct of operations.

The FFTF has been in a hot-standby condition since December 1993. In November 1995, the Department decided to limit deactivation work at FFTF to those activities which would not prohibit the facility from being returned to service in order to study the facility's capability for tritium and medical isotope production. In January 1997, the Department decided to continue to maintain the facility in standby to further evaluate the tritium and medical isotope production capabilities of the facility and to determine what role, if any, the facility could play in the Department's tritium production strategy.

In December 1998, the Secretary announced his decision not to use FFTF for tritium production and to decide in the Spring of 1999 whether the facility would be used to support any other missions. The Secretary has tasked the Department’s Nuclear Energy Research Advisory Committee to complete its review of the nation’s nuclear science and technology infrastructure in time to inform the Spring 1999 decision. Potential future missions for FFTF include medical isotope production, advanced materials research, plutonium-238 production, and nuclear energy research and development.

The requested funding level supports minimum surveillance of the FFTF while it remains on standby. However, the requested funding level will permit some plant systems required for operation to fail.

Fast Flux Test Facility

Mission Supporting Goals and Objectives

The FFTF is a multi-use facility capable of supporting the Department's strategic missions of energy resources, science and technology, and national security. The FY 2000 budget request is based on performing activities which are required to maintain the facility in a safe and environmentally-compliant condition. The FY 2000 request would allow some key plant components required for operations to fail.

Additional funding would be required to restart, deactivate, or maintain the FFTF in its current condition.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Fast Flux Test Facility (FFTF)	0 [a]	30,000 [b]	30,000	0	0.0%
Total, Fast Flux Test Facility	0 [a]	30,000 [b]	30,000	0	0.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Fast Flux Test Facility			
# Continue FFTF standby activities, such as continuing to maintain FFTF systems in compliance with Federal and State regulations and permit requirements	0	30,000	30,000
Total, Fast Flux Test Facility	0 [c]	30,000 [d]	30,000

[a] $41.7 million included in the Nuclear Materials and Facilities Stabilization budget for the Office of Environmental Management. $9.2 million of this was reprogrammed from Uranium Programs for deactivation activities at FFTF in FY 1999.

[b] Excludes $9.2 million of prior year balances reprogrammed into this account in FY 1998.

[c] $41.7 million included in the Nuclear Materials and Facilities Stabilization budget for the Office of Environmental Management. $9.2 million of this was reprogrammed from Uranium Programs for deactivation activities at FFTF in FY 1999.

[d] Excludes $9.2 million of prior year balances reprogrammed into this account in FY 1998.

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Fast Flux Test Facility	
# The FY 2000 funding request would provide funding for minimum surveillance and maintenance of the FFTF to keep it in a safe condition and in compliance with Federal and State environmental regulations. At the requested funding level, some plant systems necessary for operation would be permitted to fail.	0
Total Funding Change, Fast Flux Test Facility	0

Isotope Production and Distribution Program Fund

Program Mission

The Isotope Production and Distribution Program Fund provides all funds to the Isotope program which serves the national need for a reliable supply of isotope products, services and related technology used in medicine, industry, and research. As the range of available isotopes and the recognized uses for them have increased, isotope applications have become essential to progress in medical research and practice, new industrial processes, and scientific methodology. A substantial infrastructure has been built around the use of isotopes. Therefore, an adequate supply of medical and research isotopes is essential to the Nation's health care system, and to basic research and industrial applications that contribute to national economic competitiveness. The Department supports nuclear medicine research through direct financial assistance and by providing isotopes to researchers at reduced prices. The Department also encourages private sector investment in new isotope production ventures and will sell or lease its facilities and inventories for commercial purposes. If private sector production of a given isotope becomes well established, DOE will no longer supply that isotope.

Program Goals

Program goals for the Isotope Production and Distribution Fund are discussed in the Isotope Support section.

Program Objectives

Program objectives for the Isotope Production and Distribution Fund are discussed in the Isotope Support section.

Performance Measures

Performance measures for the Isotope Production and Distribution Fund are discussed in the Isotope Support section.

Funding Profile

No funds are requested for the Isotope Production and Distribution Fund. The budgetary resources for the Fund are received as spending authority from offsetting collections from two sources: (1) expenditure transfers of all appropriated funds from Energy Supply-Isotope Support; and (2) revenues from the sales of goods and services to the public. See the Isotope Support section for justification of the $21.0 million request for budget authority. Sales in FY 1998 were $11.0 million, and are estimated at $10.0 million for both FY 1999 and FY 2000.

Isotope Support

Program Mission

The mission of the Isotope Program is to serve the national need for a reliable supply of isotope products, services and related technology used in medicine, industry, and research. The program supports development of new or improved isotope products and services that are used in medical diagnoses and therapy, and other applications that are in the national interest. Prices charged for these products and services may not always achieve full-cost recovery to the Government. The Department encourages private sector investment in new isotope production ventures and will sell or lease its facilities and inventories for commercial purposes. If private sector production of a given isotope becomes well established, DOE will no longer supply that isotope.

All appropriations for the Isotope Support decision unit fund a payment into the Isotope Production and Distribution Fund as required by P.L. 101-101 and as modified by P.L. 103-316. Requested funding is required to maintain financial continuity of radioactive and stable isotope research, development, production, processing, distribution, and associated services to commercial and research customers. Funding will also be used to provide radioisotopes and enriched stable isotopes for research and development, medical diagnosis and therapy, isotopes applications, to support nuclear medicine research, and to support administrative activities.

By August 1999, the Department will complete the modification of facilities at Sandia National Laboratories, New Mexico, required to support molybdenum-99 (Mo-99) production sufficient to meet 100 percent of U.S. demand. The revision of all safety documentation and operational procedures for the facilities, started in fiscal year 1998, and will be completed in fiscal year 1999. The Department's capital investment in the Mo-99 project will thus be completed in fiscal year 1999 and the goal of achieving a backup supply of Mo-99 will have been met. Mo-99 is the most widely used isotope. Isotopes are used in over 40,000 medical procedures per day in the U.S. to diagnose maladies, such as cancer and heart disease. The Mo-99 project will be at a point that 1) production of Mo-99 can be mobilized on an emergency basis if the foreign supply of Mo-99 is significantly disrupted, and 2) the Sandia facilities are ready for the private sector to make further investments to take the project to routine commercial production.

The fiscal year 2000 budget request for Isotope Support is $21,000,000. This budget request combined with projected revenues of $10,000,000 should provide the Isotope Production and Distribution Fund sufficient capital to meet total estimated program expenses of $31,000,000.

Isotopes supports the DOE Strategic Plan and the fiscal year 2000 Performance Plan as follows:

Science and Technology Objective 2 - Deliver leading-edge technologies that are critical to the DOE mission and the Nation

  - Fiscal Year 2000 Strategy - The Department will develop new or improved isotope products and services that enable medical diagnoses and therapy, and other applications that are in the national interest, and encourage private sector investment in new isotope production ventures and sell or lease facilities and inventories for commercial purposes.

Program Goals

Support, in collaboration with other Federal agencies, vital, advanced research that applies to DOE-produced research isotopes. *(Program Goal 1)*

Develop new isotopes and isotope application technology to meet future national needs. *(Program Goal 2)*

Provide a reliable supply of quality products and services based on customers' needs. *(Program Goal 3)*

Program Objectives

Work with stakeholders, customers, and advisory groups to identify and develop new applications utilizing isotope products and technologies. *(Program Objective 1 supports Program Goal 2)*

Support and encourage advanced research applying DOE-produced research isotopes. *(Program Objective 2 supports Program Goal 1)*

Invest in new product processes and application development initiatives. *(Program Objective 3 supports Program Goal 2)*

Manage and operate the Isotope Program in a cost-effective manner that best serves the interests of its customers and the U.S. taxpayers. *(Program Objective 4 supports Program Goal 3)*

Continue to improve product quality and services and enhance customer satisfaction. *(Program Objective 5 supports Program Goal 3)*

Ensure that environmental safety, health, and transportation safeguards requirements are met in the conduct of Isotope Program site activities. *(Program Objective 7 supports Program Goals 1, 2, and 3)*

Achieve maximum private sector involvement in isotope activities by identifying those with privatization potential and then assisting the private sector in privatizing those that are commercially viable. *(Program Objective 8 supports Program Goal 3)*

Performance Measures

In FY 1998, completed 80 percent of the Sandia Hot Cell Facility construction modifications and processing equipment installation activities needed to achieve the facility capability to process 100 percent of the U.S. demand for molybdenum-99. **(Fully Successful)**

In FY 1999, initiate construction and commissioning of the Los Alamos Target Irradiation Station, improving isotope quality with greater operating efficiency.

In FY 1999, complete equipment installation necessary for an emergency backup supply of molybdenum-99, issue a request for proposals to privatize molybdenum-99 production and business activities by May 1999, and after evaluation, award a contract by September 1999 to the most qualified firm.

By the end of FY 2000, complete at least 60 percent of the construction of the Los Alamos Target Irradiation Station, which is needed for the production of short-lived isotopes for medical research.

In FY 2000, implement the Advanced Nuclear Medicine Initiative by providing isotopes or financial assistance for up to five researchers.

Complete privatization activities associated with production and sales of commercial isotopes by the end of FY 2000.

Supply quality stable and radioactive isotopes for industrial, research, and medical applications that continue to meet customer specifications and maintain 95 percent on-time deliveries. **(Fully Successful in FY 1998)**

In FY 2000, invest in two new process development technologies, as requested by researchers, that enhances isotope production, services and delivery application systems.

Respond to customer requests for information within 48 hours.

Keep customer complaints to less than four percent of all deliveries made.

Hold annual stakeholder meetings in conjunction with international and regional trade shows.

Significant Accomplishments And Program Shifts

Researchers throughout the United States are assessing radioisotopes that emit alpha and beta particles that can destroy cancer cells and reduce tumors. For example rhenium-188 is a beta-emitting radioisotope that may prove useful in treating several cancers. Alpha-emitters such as bismuth-213 also have shown certain cancer therapy properties. Also, use of radioisotopes for the prevention of restenosis in helping arteries stay unclogged after coronary angioplasty. The Department will continue to provide limited support for production. Any changes or increases in

demand, due to success in pre-clinical trials, will require a change in production capability and additional resources.

- There is a growing demand for a reliable year-round supply of short-lived accelerator-produced isotopes for medical research. The Department is attempting to make accelerator isotopes available for up to 52 weeks. Without the completion of the Los Alamos Target Irradiation Station, the Department's ability to produce most important short-lived research isotopes will be virtually eliminated, resulting in a crucial shortage of research isotopes.

- The Isotope Program will seek cooperative supply agreements with other isotope manufacturers.

- Privatization of selected Isotope Program activities will result in a decrease in both expenses and resources. The program will continue to seek opportunities for the private sector to assume its activities.

- Continue to produce and distribute essential isotopes to meet national demand when no domestic or private sector capability exists; where unique Government production facilities are needed such as nuclear reactors or large accelerators; or where non-Federal productive capacity is insufficient to meet U.S. needs.

- Measure and enhance customer satisfaction by actively soliciting customer feedback and seeking to implement their recommendations.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Isotope Support					
Operation and Maintenance	19,473	15,500	0	15,500	13,000
Construction	0	6,000	0	6,000	8,000
Total Isotope Support	19,473	21,500	0	21,500	21,000

Funding by Site [a]

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	1,421	7,650	8,000	+350	+4.6%
Sandia National Laboratory	12,643	8,700	3,500	-5,200	-59.8%
Total, Albuquerque Operations Office	14,064	16,350	11,500	-4,850	-29.7%
Chicago Operations Office					
Brookhaven National Laboratory	1,600	2,000	2,200	+200	+10.0%
Oak Ridge Operations Office					
Oak Ridge National Laboratory	2,730	2,800	2,970	+170	+6.1%
Richland Operations Office					
Pacific Northwest National Laboratory	550	350	0	-350	-100.0%
All Other Sites	529	0	4,330	+4,330	+100.0%
Total, Isotope Support	19,473 [b]	21,500	21,000	-500	-2.3%

Site Descriptions

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) is a U.S. Department of Energy (DOE) scientific research laboratory located in New Mexico. The Isotope Production Facility at LANL operates about 22 weeks per year. This accelerator facility produces radioisotopes using either the primary proton beam or neutrons from the beam stop of the Los Alamos Neutron Science Center (LANSCE), a half-mile-long accelerator that delivers medium energy protons. The unique characteristics of the LANSCE accelerator include a high energy, high beam current that allows production of higher quality radioisotopes, as well as exotic radioisotopes that cannot be produced in other facilities. Three major products produced at the site are germanium-68, a calibration source for positron emission tomography (PET) scanners; strontium-82, the parent of rubidium-82, used in cardiac PET imaging; and sodium-22, a positron-emitter used in neurologic research.

[a] Since the Isotope Program operates like a business, funding at isotope production sites can increase or decrease depending on demand, cash collections, production efficiencies, and availability of facilities.

[b] Reflects an additional $3,700,000 provided through a transfer of appropriations to accelerate the capability to process 100 percent of the U.S. demand for Mo-99.

Sandia National Laboratory

Sandia National Laboratory (SNL) is a U.S. Department of Energy (DOE) scientific research laboratory located in New Mexico. SNL's Annual Core Research Reactor (ACRR) is a 2 megawatt, pool-type research reactor that is used to produce isotopes for medical applications. The ACRR is a highly flexible facility applied to the mission requirements of the Department in both isotope and national security applications.

Mo-99 is a precursor of technetium-99m, an isotope that is used in over 36,000 medical procedures per day in the United States to diagnose maladies such a cancer and heart disease. Sixty percent or more of the U.S. supply currently depends on a single aging reactor in Canada that will cease isotope production in the year 2004. The vulnerability of the Canadian supply was demonstrated when the labor force at the reactor site went on strike in June 1977 and May 1998. The ACRR and SNL's nearby Hot Cell Facility, along with LANL's Chemistry and Metallurgy Research Facility, have been modified for production of Mo-99 and related medical isotopes on an emergency basis if the foreign supply of Mo-99 is significantly disrupted. The capital investment to prepare for Mo-99 production will be completed in fiscal year 1999. The Mo-99 facility will be ready for the private sector to make further investments to implement routine commercial production.

Brookhaven National Laboratory

Brookhaven National Laboratory (BNL) is a U.S. Department of Energy (DOE) scientific research laboratory located on Long Island, New York. The Brookhaven Linear Isotope Producer (BLIP) at BNL uses a linear accelerator that injects 200 million-electron-volt protons into the 33 billion-electron-volt Alternating Gradient Synchrotron. The BLIP facility operates about 16 weeks per year and produces radioisotopes such as strontium-82, germanium-68, copper-67, and others that are used in medical diagnostic applications. BNL is also active in the development of new isotope processes and delivery systems.

Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL) is a U.S. Department of Energy scientific research laboratory located in Oak Ridge, Tennessee. The High Flux Isotope Reactor (HFIR) at ORNL provides one of the world's highest steady-state neutron fluxes. The reactor is normally scheduled to operate about 43 weeks per year to support primary missions other than isotope production. Isotope products made at this facility include: tungsten-188, rhenium-186, californium-252, and iridium-192. One target position with hydraulic capability to simultaneously load and unload up to eight target cans is available and is heavily used for medical radioisotope production. Additional peripheral target positions will become available in the second half of fiscal year 1998. The program depends heavily on HFIR for isotope production.

The electromagnetic calutrons at ORNL separate isotopes with the same atomic number, but different mass, to produce enriched stable isotopes. During this process, mixed isotope material is vaporized (heated) and then ionized. The ionized particles are accelerated, and their trajectories are bent by a magnetic field. The lighter particles separate from the heavier particles as they travel in an arc and are deposited on collectors, from which they are removed, chemically purified, and placed in inventory as enriched stable isotopes. Fifty-five chemical elements can be isotopically separated in the calutrons to produce 225 enriched stable isotopes. Currently, the calutrons are placed in a cold-standby mode with minimum maintenance.

All Other Sites

This category includes providing direct assistance to Universities or research institutions, or to DOE laboratories yet to be determined for producing isotopes or related reviews or to fund isotope related research based on a peer-reviewed selection process.

Operation and Maintenance

Mission Supporting Goals and Objectives

The Department, through the Isotope Program, provides radioactive and stable isotope products and associated services to a wide and varied domestic and international market. Ultimate applications of isotope products include medical research and health care, industrial research and manufacturing, education, and national defense. The Isotope Program mission is to serve the national need for a reliable supply of isotope products services and related science and technology used in medicine, industry, and research. The program supports development of new or improved isotope products and services that enable medical diagnoses and therapy, and other applications that are in the national interest. Prices charged for these products and services may not always achieve full-cost recovery to the Government. The Department encourages private sector investment in new isotope production ventures and will sell or lease its facilities and inventories for commercial purposes. If private sector production becomes well established, DOE will no longer supply that particular isotope.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Operation and Maintenance	19,473	15,500	13,000	-2,500	-16.1%
Construction	0	6,000	8,000	+2,000	+33.3%
Total, Isotope Support	19,473	21,500	21,000	-500	-2.3%

Many uses for isotopes have emerged over the past generation as an adjunct of nuclear research, defense, and power development programs. As the range of available isotopes and the recognized uses for them have increased, isotope applications have become necessary to achieve progress in medical research and practice, new industrial processes, and scientific methodology.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Operations and Maintenance			
# Isotope Production and Distribution maintains core personnel and operating capability at three of five sites and partial operations at a fourth isotope production site. The calutrons and the remaining sites will be maintained in a standby status. This will enable the production, packaging and distribution of radioactive and stable isotopes for about 18 major products, services, and processing of many forms and types of stable isotopes from inventory. This estimate was based on serving about 200 customers and over 1,100 deliveries. Limited support will also be provided for the separation of uranium, from existing stockpiles at Oak Ridge, for an expanding alpha-emitter isotope market. Maintain nuclear facility operations.	10,330	10,300	10,500
# Mo-99 Initiative			
▸ Conduct Operational Readiness Review for modified reactor, complete Hot Cell Facility major construction modifications for establishing full processing capacity, and initiate fabrication of the targets at the Los Alamos Chemistry and Metallurgy Research facility for future Mo-99 production	9,143	0	0
▸ Continue target production, install production scale target processing equipment in Hot Cell Facility, thus completing DOE's investment in this project. Complete the Mo-99 initiative.	0	5,200	0
Total, Mo-99 Initiative	9,143	5,200	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
# Advanced Nuclear Medicine Initiative ▸ Sponsor nuclear medical science using a peer review selection process. DOE support will be in two forms: direct research financial assistance and making isotopes available for research at prices that researchers can afford; ▸ Encourage the training of individuals in nuclear medicine methods by establishing university scholarships and fellowships for nuclear medicine specialists and by sponsoring summer internships at appropriate institutions; ▸ Initiate a focused program to apply alpha-emitting isotopes available in the U.S. from the DOE to fight a spectrum of malignant diseases including most common cancers and infectious diseases such as meningitis and AIDS. Non-malignant applications may include treatment of other immune disorders and of rheumatoid and degenerating joint diseases.	0	0	2,500
Total, Operation and Maintenance	19,473	15,500	13,000
Construction			
# Complete engineering, design, and construction work inside the existing beam tunnel. Engineering and design of the new tunnel section and target station will be completed. Construction of the target station and new beam tunnel section will be started in FY 1999 and completion is expected in FY 2001. Any delay in schedule will result in a shortage of isotopes, loss of $1.5 million of revenue and incurred fixed costs of $2.3 million..	0	6,000	8,000
Total, Isotope Support	19,473	21,500	21,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Operations and Maintenance	
# Complete the Mo-99 initiative	-5,200
# Implement the Advanced Nuclear Medicine Initiative	+2,500
# Increase in production costs	+200
Total, Operations and Maintenance	-2,500
Construction	
# Construct the Los Alamos Target Irradiation Station for accelerator, medical, and research isotopes	+2,000
Total Funding Change, Isotope Support	-500

Capital Operating Expenses & Construction Summary

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Approp-riations	FY 1998 Request	FY 1999 Approp.	FY 2000 Approp.	Unapprop. Balance
99-E-201, Isotope Production Facility, TA-53	14,000	0	0	6,000	8,000	0
Total, Construction		0	0	6,000	8,000	0

99-E-201, Isotope Production Facility, TA-53, Design and Construction, Los Alamos National Laboratory, Los Alamos, New Mexico

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	1Q 1998	4Q 1998	1Q 1998	2Q 2000	12,065	12,843
FY 2000 Budget request *(Current Baseline Estimate)*	1Q 1999	4Q 1999	1Q 2000	3Q 2001	14,000	15,520

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
1999	6,000	6,000	4,217
2000	8,000	8,000	7,430
2001	0	0	2,353

3. Project Description, Justification and Scope

This project proposes to build a new target irradiation facility for the production of radioisotopes at the Los Alamos Neutron Science Center (LANSCE) accelerator. The project started in FY 1999 will include installation of a beam switching device at the point where the beam is diverted, construction of a short beam line to the targeting area, and construction of a target handling facility with a beam stop. This facility will utilize a 100 MeV proton beam obtained by diverting a portion of the main LANSCE beam before it enters the final portion of the accelerator and directing it to a new targeting area dedicated to isotope production. In most cases production of radioisotopes is both more efficient and more selective with low beam energies (100 MeV) than with the high beam energy currently being used at Los Alamos (800 MeV). Therefore, once the new facility is in operation, the program will continue to produce most of the same isotopes, but with greater efficiency.

The proposed target irradiation facility will replace the existing Isotope Production Facility, which is located at TA-53 in building MPF-3 at the east end of Area A of LANSCE. However, Area A, where the existing Isotope Production Facility is located, will be rendered inoperable by the proposed reconfiguration of the LANSCE accelerator complex thereby, preventing Los Alamos to produce these isotopes.

The Isotope Program has been one of the more successful and visible ongoing activities at Los Alamos. It has used the unique capabilities of the Laboratory's facilities and staff to respond to a well recognized national need for radioisotope production and development. Today there are many customers in industry, research institutions, the medical community, academia, and other agencies who purchase the 30+ radioisotopes produced in the Isotope Production Facility at LANSCE. Because the current Laboratory plan to redirect the focus of the LANSCE accelerator complex toward neutron science, this has placed the use of the existing Isotope Production Facility in jeopardy. This change in focus can be viewed as an opportunity for the Isotope Production and Distribution Program to construct a dedicated radioisotope production facility which can operate on a noninterference basis with any of the proposed LANSCE configurations while at the same time operating at a lower beam intensity than the present Isotope Production Facility. This new facility would advance the Department of Energy's objective to be a reliable domestic source of research radioisotopes crucial for the future of industry, education and medicine.

The proposed facility would be located on the north side of the LANSCE linear accelerator (linac) building near the west end of the accelerator complex. A beam line would be built from the transition region between the Drift Tube Linac and the Side Coupled Cavity Linac extending to the northeast to a targeting facility located to the north of Sector A. The new beam line will be approximately 100 feet in length with the beam line center expected to be between 20 and 35 feet below grade. The targeting facility would be located within a new building located above the end of the beam line. This building will be approximately 3000 square feet in area, and will house all the necessary equipment and control systems for carrying out target irradiations. This building will include a high bay area with overhead cranes.

This project will include design, excavation, and construction of the beam line tunnel, design and construction of the beam line and its control systems, design and construction of the building to house the targeting facility, and design and construction of the target handling and control systems. The beam tunnel construction modification must be completed during the LANSCE accelerator outage in 1999.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design	1,537	1,292
Design Management costs @ 20.9% of Design [a]	321	321
Project Management costs @ 19.7% of Design	303	211
Total, Design Phase	2,161	1,824
Construction Phase		
Improvements to Land	521	625
Buildings	3,229	3,129
Special Equipment	3,296	3,175
Utilities	158	61
Inspection, design and project liaison, testing, and acceptance	852	842
Construction Management @ 3.7% of Construction	298	290
Project Management @ 9.6% of Construction	773	568
Total, Construction Phase	9,127	8,690
Contingencies @ 24% of Design and Construction		
Design	737	496
Construction	1,975	1,055
Total, Contingencies	2,712	1,551
Total, line item costs (TEC)	14,000	12,065

5. Method of Performance

Procurement will be accomplished under fixed-price contracts awarded on the basis of competitive bidding. Utilities upgrades will be done by fixed price contractors and the Laboratory's support services contractor. The M & O contractor and contracted Architect-Engineers will perform construction inspection.

[a] Percentages are calculated for Current Estimate numbers only.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1999	FY 2000	FY 2001	Outyears	Total
Project cost						
Facility cost						
Design	0	2,805	91	0	0	2,896
Construction	0	1,412	7,339	2,353	0	11,104
Total, Line Item (TEC)	0	4,217	7,430	2,353	0	14,000
Other project costs						
Conceptual Design costs . .	545	0	0	0	0	545
Other ES&H costs	93	0	0	0	0	93
Other project related costs [a]	827	0	0	55	0	882
Total, Other project costs	1,465	0	0	55	0	1,520
Total Project Cost (TPC)	1,465	4,217	7,430	2,408	0	15,520

7. Related Annual Funding Requirements

(FY 2003 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs	285	285
Annual facility maintenance/repair costs	111	111
Utility costs	39	39
Total related annual funding	435	435
Total operation cost (operating from FY 2003 through FY 2022)	8,700	8,700

[a] Other project related costs - This item includes the costs for creating as-builds for the existing facility beamline, shielding calculations, and engineering studies to refine the magnet, beamline and target designs to integrate into the existing facility.

Program Direction

Mission Supporting Goals and Objectives

The Office of Nuclear Energy, Science and Technology (NE) Program Direction account funds expenses associated with the technical direction and administrative support of NE programs.

Program Direction has been grouped into four categories:

Salaries and Benefits provides salary and benefits funding for Headquarters and Operations Office personnel providing technical direction to Nuclear Energy Research and Development activities, Isotope programs, Termination Cost programs, Uranium programs, as well as Office of Science funded energy research reactor operations (*e.g.*, the High Flux Isotope Reactor at the Oak Ridge National Laboratory), transition activities at the Fast Flux Test Facility (FFTF), and activities funded by other Federal agencies and foreign governments. This category includes funding for other personnel compensation, such as, cash incentive awards and overtime pay.

Travel includes funding for transportation of Headquarters and Operations office employees associated with NE programs, their per diem allowances while in authorized travel status, and other expenses incidental to travel.

Support services includes funding for technical and management support services provided to NE Headquarters and Operations office employees.

Other related expenses includes funding for administrative expenses, such as: training, computer hardware and software acquisitions, modifications, and publication and subscription services. In FY 1997, the Department's central administrative office established a Working Capital Fund to provide funding for mandatory administrative costs, such as, rent and telephone services. Payments into this fund are continued as part of the other related expenses category.

In FY 2000 the salary, benefits, travel, and related administrative expenses for the International Nuclear Safety Program and the Highly Enriched Uranium Transparency Measures Program have not been included based on the reassignment of these functions to the Office of Nonproliferation and National Security.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chicago					
Salaries and Benefits	1,202	1,239	1,376	+137	+11.1%
Travel	105	82	86	+4	+4.9%
Support Services	91	50	60	+10	+20.0%
Other Related Expenses	32	42	44	+2	+4.8%
Total, Chicago	1,430	1,413	1,566	+153	+10.8%
Full Time Equivalents	12	12	12	0	0.0%
Idaho					
Salaries and Benefits	95	95	104	+9	+9.5%
Travel	10	10	10	0	0.0%
Support Services	0	0	0	0	0.0%
Other Related Expenses	3	3	3	0	0.0%
Total, Idaho	108	108	117	+9	+8.3%
Full Time Equivalents	1	1	1	0	0.0%
Oak Ridge					
Salaries and Benefits	2,536	2,389	2,511	+122	+5.1%
Travel	90	91	71	-20	-22.0%
Support Services	118	450	500	+50	+11.1%
Other Related Expenses	449	589	462	-127	-21.6%
Total, Oak Ridge	3,193	3,519	3,544	+25	+0.7%
Full Time Equivalents [a]	28	27	27	0	0.0%
Oakland					
Salaries and Benefits	200	200	108	-92	-46.0%
Travel	35	10	10	0	0.0%
Support Services	5	0	0	0	0.0%
Other Related Expenses	18	32	23	-9	-28.1%
Total, Oakland	258	242	141	-101	-41.7%
Full Time Equivalents [a]	2	2	1	-1	-50.0%

[a] Excludes reimbursables.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Richland					
Salaries and Benefits	600	451	622	+171	+37.9%
Travel	10	15	16	+1	+6.7%
Support Services	0	0	0	0	0.0%
Other Related Expenses	0	0	0	0	0.0%
Total, Richland	610	466	638	+172	+36.9%
Full Time Equivalents	5	5	6	+1	+20.0%
Headquarters					
Salaries and Benefits	12,502	12,885	11,169	-1,716	-13.3%
Travel	518	676	525	-151	-22.3%
Support Services	300	3,200	5,290	+2,090	+65.3%
Other Related Expenses	2,081	2,191	1,970	-221	-10.1%
Total, Headquarters	15,401	18,952	18,954 [a]	+2	+0.0%
Full Time Equivalents	129	123	93	-30	-24.4%
Total Nuclear Energy					
Salaries and Benefits	17,135	17,259	15,890	-1,369	-7.9%
Travel	768	884	718	-166	-18.8%
Support Services	514	3,700	5,850	+2,150	+58.1%
Other Related Expenses	2,583	2,857	2,502	-355	-12.4%
Subtotal, Program Direction	21,000	24,700 [b]	24,960 [a]	+260	+1.1%
Use of Prior-Year Balances	0	0	0	0	0.0%
Total, Program Direction	21,000	24,700 [b]	24,960 [a]	+260	+1.1%
Full-Time Equivalents	177	170	140 [a]	-30	-17.6%

[a] The salary, benefits, travel, and related administrative expenses for the International Nuclear Safety Program and the Highly Enriched Uranium Transparency Measures Program have not been included in FY 2000 based on the reassignment of these functions to the Office of Nonproliferation and National Security.

[b] Excludes $2.15 million included in a reprogramming.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
NE Headquarters has streamlined its organizational structure from a multilayered organization to a single layered organization; downsized from 258 employees in 1993 to a current level of 96 employees (excluding 27 International Nuclear Safety and Highly Enriched Uranium Transparency Measures Programs employees reassigned to the Office of Nonproliferation and National Security); met strategic Alignment Initiative staffing targets; met or exceeded National Performance Review targets; retrained and redeployed administrative staff to reduce dependence on contractors; and redirected and realigned staff (most recently in August 1998) to accomplish program goals efficiently and effectively. NE field staffing has also been reduced from 75 in August 1995 to a current level of 47. The current assignment of NE field employees includes Chicago Operations Office (12), Idaho Operations Office (1), Oakland Operations Office (2), Oak Ridge Operations Office (27), and the Richland Operations Office (5). FY 1998 and FY 1999 salaries and benefits include appropriated funds for employees reassigned on October 11, 1998 to the Office of Nonproliferation and National Security. The FY 2000 salaries and benefits amount does not include funds for INSP and HEU Transparency Measures Program staff. As part of the Department's Workforce 21 initiative, authorization has been requested for twelve additional Headquarters positions in accordance with the January 11, 1999 NE Workforce Staffing Plan . . .	17,135	17,259	15,890

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Travel			
In accordance with the Departmental initiative to reduce travel costs, a series of actions have been taken to reduce Headquarters travel. Guidelines were issued to eliminate unnecessary or low value travel, multiple travelers to the same location/meeting are being limited. Conference attendance is being severely limited. Use of video-conferencing is encouraged whenever possible. NE field employees travel costs are similarly included in the Departmental travel costs reduction initiative. FY 1998 and FY 1999 travel includes appropriated funds for International Nuclear Safety and Highly Enriched Uranium Transparency Measures Programs Headquarters and Operations Office travel expenses. The FY 1999 travel budget also includes funding provided to support the temporary overseas assignment of one Operations Office employee to the Nuclear Energy Agency. The FY 2000 amount does not include Headquarters and Operations Office expenses for INSP and HEU Transparency Measures Program travel based on the reassignment of these programs to the Office of Nonproliferation and National Security on October 11, 1998.	768	884	718
Support Services			
In accordance with the Departmental initiative to reduce the level of support services contracting, NE has reduced Headquarters support services contracting from $10.6 million in support services contracts in FY 1995. NE's FY 1998 support services contracting (Headquarters and Field) was $ 6.809 million (including amounts in program budgets). Beginning in FY 1999, in accordance with Congressional direction, all funds for support services contracting were included in the Program Direction budget. FY 1999 funds include both Headquarters ($ 3.2 million) and Field ($ 0.5 million) support services contracting. FY 1999 funding does not include $2.15 million pending submittal of a reprogramming request for essential support services. FY 2000 funding is based on the revised FY 1999 request level. Support services for NE Field employees are in accordance with Operations Office plans to reduce support services contracting as part of the same Departmental support services cost reduction initiative	514	3,700 [a]	5,850

[a] Excludes $2.15 million included in a reprogramming.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Other Related Expenses			
FY 1998 and 1999 amounts include appropriated funds for International Nuclear Safety and Highly Enriched Uranium Transparency Measures Programs other related expenses. The FY 2000 amount does not include expenses for the INSP and HEU Program based on the October 11, 1998 reassignment of these programs to the Office of Nonproliferation and National Security. The single largest expenditure ($1.35 million in FY 2000) in the other related expenses category is earmarked for the Headquarters Working Capital Fund (WCF). Compared to FY 1998, FY 1999 WCF funding increased $110K, primarily for additional office space costs occasioned by the transfer of the International Nuclear Safety Program and the Highly Enriched Uranium Transparency Measures Program staff from NE to NN. Operations Office funding also increased ($170K) in accordance with annual operations plans. The Other Related Expense category also includes a payment for the recovery of Departmental Administration and Security Investigations costs incurred by Departmental elements with regard to NE's Isotope Program. Finally, this category includes expenses for ADP hardware and software support, training, periodicals and subscriptions, etc.	2,583	2,857	2,502
Total, Program Direction	21,000	24,700	24,960

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Benefits	
# Decrease is due to the reorganization and reassignment of the International Nuclear Safety and Highly Enriched Uranium Transparency Measures Programs to the Office of Nonproliferation and National Security (-3,007) and adjustments for general pay increases, promotions, within grade increases and revised staffing levels at Headquarters and the Field (+1,638).	-1,369
Travel	
# Decrease is due to the reorganization and reassignment of the International Nuclear Safety and Highly Enriched Uranium Transparency Measures Programs to the Office of Nonproliferation and National Security (-170) and adjustments for escalation (+4)	-166
Support Services	
# FY 1999 support services funding level does not include a $2.15 million pending reprogramming request. FY 2000 support services contracting plans are based on reprogramming request funding level.	+2,150
Other Related Expenses	
# Decrease due to the reorganization and reassignment of the International Nuclear Safety and Highly Enriched Uranium Transparency Programs to the Office of Nonproliferation and National Security (-281), reductions in Operations Offices projected requirements (-114), and adjustments for escalation in Headquarters Working Capital Fund expenses (+40).	-355
Total, Program Direction	+260

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Feasibility of Design Considerations	0	800	1,150	+350	+4.4%
Economic and Environmental Analysis	0	485	1,300	+815	+168.0%
Test and Evaluation Studies	300	1,183	1,583	+400	+33.8%
Total, Technical Support Services	300	2,468	4,033	+1,565	+63.4%
Management Support Services					
Management Studies	0	0	500	+500	+100.0%
ADP Support	0	517	542	+25	+4.8%
Administrative Support Services	214	715	775	+60	+8.4%
Total, Management Support Services	214	1,232	1,817	+585	+47.5%
Total, Support Services	514	3,700	5,850	+2,150	+58.1%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Working Capital Fund	1,425	1,535	1,350	-185	-12.1%
ADP/TeleVideo Hardware and Software	325	325	325	0	0.0%
Subscriptions/Publications	40	40	30	-10	-25.0%
Training	80	80	64	-24	-30.0%
Departmental Administrative Fee	125	125	125	0	0.0%
Other Miscellaneous	548	702	568	-134	-19.1%
Office Logistical Support	40	50	40	-10	-20.%
Total, Other Related Expenses	2,583	2,857	2,502	-355	-12.4%

Uranium Programs

Program Mission

This program supports important government activities related to the Federal uranium enrichment program that were not transferred to the United States Enrichment Corporation (USEC Inc.). In particular, this program addresses the facility and environmental legacies associated with the enrichment program, management of government assets, and associated research and development.

One of the principal missions of Uranium Programs activities is to effectively manage the Department's depleted uranium hexafluoride (DUF_6) inventories. The Department's major mission for depleted uranium is to ensure that an estimated 46,400 cylinders of depleted uranium hexafluoride are maintained in an environmentally responsible manner by conducting annual cylinder inspections, and developing and implementing options to repair cylinders exhibiting accelerated corrosion. In addition, the Department will complete an evaluation of a long-term management strategy options for the DUF_6 as part of a programmatic environmental impact statement. NE expects to issue a record of decision on this program in mid-FY 1999.

In addition to appropriations received for management of DOE-generated depleted uranium hexafluoride, the Department received in FY 1998 $66 million from the U.S. Enrichment Corporation for the management and disposition of about 11,200 additional USEC-generated depleted uranium cylinders. In response to the FY 1999 appropriations language, the Department submitted, on December 17, 1998, its initial plan for applying the $66 million received from USEC. These funds are administered in accordance with the terms of the two Memoranda of Agreement (MOAs) and related correspondence for activities required to accept and maintain the USEC material.

On July 21, 1998 the President signed P.L. 105-204, an act requiring that the Secretary of Energy prepare a plan and proposed legislation for the disposition of depleted uranium hexafluoride. This plan is being prepared and is expected to be submitted to Congress with the President's new legislative budget proposals.

Other Uranium Programs activities at the gaseous diffusion plants in Portsmouth, Ohio; Paducah, Kentucky; and Oak Ridge, Tennessee include maintenance of facilities and grounds, cleaning legacy PCB spills in the leased areas of the diffusion site consistent with the Federal Facilities Compliance Act, guarding and protecting HEU material stored at the Portsmouth site, and addressing financial liabilities by paying post retirement life and medical costs for retired contractor personnel at the diffusion sites and power suppliers, and by providing legal representation for existing lawsuits. Lastly, after assisting in the transfer of regulatory oversight of the leased facilities and obtaining an initial certificate of compliance from the Nuclear Regulatory Commission (NRC), the Department continues to review and update Safety Analysis Reports (SARs) as necessary, for the non-leased facilities and assist the NRC in preparing annual congressional reports on the status of the diffusion plants.

NE is also responsible for the management and disposition of the Department's excess natural uranium inventories. These excess inventories include uranium originally purchased for government purposes, and inventories received from the U.S./Russia Highly Enriched Uranium Purchase Contract as directed by the USEC Privatization Act. In FY 1999, NE will administer $325.0 million provided in the emergency appropriations bill (P.L. 105-277) for the purchase of natural uranium pursuant to 1997 and 1998 deliveries under the U.S./Russian HEU Agreement.

Uranium Programs supports the DOE Strategic Plan and the FY 2000 Performance Plan as follows:

Environmental Quality Objective 6 - Reduce life-cycle costs of environmental cleanup.

- FY 2000 Strategy - The Department will reduce the disposition cost of depleted uranium by exploring and developing alternative government uses for the material. Perform depleted uranium hexafluoride cylinder maintenance activities that are protective of workers and the environment.

Program Goals

- Manage Office of Nuclear Energy, Science and Technology (NE) facilities at Portsmouth, Ohio; Paducah, Kentucky; and Oak Ridge, Tennessee in a safe, economic, and environmentally-sound manner. *(Program Goal 1)*

- Ensure that the estimated 46,400 cylinders of depleted uranium hexafluoride within the DOE inventory are maintained in an environmentally responsible manner by conducting annual inspections and exploring options to effectively treat cylinders that exhibit accelerated corrosion, and conducting cost-shared projects with industry for the conversion of UF_6 to uranium oxide and/or metal. The Department is completing an environmental impact statement on the long-term management of its inventory of depleted uranium. A record of decision will be issued by mid- FY 1999. *(Program Goal 2)*

- Maintain in an environmentally safe condition the cylinders of DUF_6 received from USEC. *(Program Goal 3)*

- Prudently manage the Department's inventory of excess natural uranium, including Russian uranium transferred to the Department from USEC as required by the USEC Privatization Act. *(Program Goal 4)*

Program Objectives

- Manage the collection and disposal of PCB spills at the leased gaseous diffusion plants and maintain the non-leased facilities in a safe and environmentally-sound condition. *(Program Objective 1 supports Program Goal 1)*

- Manage the pre-existing liabilities incurred before the creation of the USEC in 1993 and manage the additional liabilities as a result of the 1996 legislation supporting the privatization of USEC. *(Program Objective 2 supports Program Goal 1 and 2)*

Manage and disposition natural uranium and depleted uranium hexafluoride inventories in a safe, economic, and environmentally-sound manner. *(Program Objective 3 supports Program Goal 3)*

Performance Measures

In FY 1998, completed the dilution of about 14 metric tons of excess highly enriched uranium (approximately 3.5 metric tons in FY 1998) to LEU at the Portsmouth Gaseous Diffusion Plant. *(Performance Measure supports Program Objective 3)* **(Fully Successful)**

In FY 1998, completed 80 percent of the final programmatic environmental impact statement for selecting the long-term management strategy for the depleted UF_6. *(Performance Measure supports Program Objective 3)* **(Successful)**

In FY 1999, remove all highly enriched uranium oxides from the Portsmouth site. *(Performance Measure supports Program Objective 5)*

Meet all legal commitments for post-retirement life and medical costs for retirees who supported the Uranium Enrichment Program before July 1, 1993. *(Performance Measure supports Program Objective 2)*

Maintain compliance with the Toxic Substances Control Act (TSCA), the Uranium Enrichment TSCA Federal Facilities Compliance Agreement (FFCA), DOE orders and other requirements and perform minimal corrective maintenance and inspections. *(Performance Measure supports Program Objective 1)*

Meet all commitments to the Ohio Environmental Protection Agency and the Defense Nuclear Facilities Safety Board to ensure the safety of the Department's inventory of depleted uranium hexafluoride. *(Performance Measure supports Program Objective 3)*

In FY 2000, through the NEPA decision-making process, establish and begin implementing the long-term strategy for the management of the Department's depleted uranium hexafluoride inventories. *(Performance Measure supports Program Objective 3)*

Significant Accomplishments And Program Shifts

The transparency measures program has been transferred from of the Office of Nuclear Energy, Science and Technology to the Office of Nonproliferation and National Security, and beginning in FY 2000 is no longer included in the Uranium Programs budget.

In FY 1999, complete the transfer of remaining highly enriched uranium oxides at the Portsmouth Site to USEC for dilution to low enriched uranium as authorized by the USEC Privatization Act of 1996 (P.L. 104-134, Subchapter A).

- A Memorandum of Agreement between DOE and USEC dated May 18, 1998 was signed that provided for USEC to pay DOE $16 million in complete satisfaction of USEC's obligation for all costs associated with the storage of the depleted uranium generated by USEC during the pre-privatization period. On June 30, 1998, USEC and DOE signed another Memorandum of Agreement under which 16.6 million kgU of USEC depleted uranium generated after privatization will transfer to DOE, in exchange for $50 million. On December 17, 1998, the Department submitted its initial plan to Congress for applying the $66 million received from USEC under the two MOAs.

- A draft programmatic environmental impact statement (PEIS) on the long-term management of the Department's depleted uranium was issued for public comment on December 24, 1997. The Department plans to issue the final PEIS in the second quarter of FY 1999 and the related record of decision (ROD) in mid-FY 1999.

- Conduct demonstration projects that have the objectives of: (1) reducing the eventual disposal cost of depleted uranium; and (2) stimulating the use of depleted uranium and thereby reduce the level of material that must be disposed in the future.

- On July 21, 1998, the President signed P.L. 105-204, an act requiring that the Secretary of Energy develop a plan and proposed legislation for the disposition of depleted uranium hexafluoride and for the construction of, beginning no later than January 31, 2004, facilities at Paducah and Portsmouth to treat and recycle depleted uranium hexafluoride consistent with the National Environmental Policy Act. This plan is being prepared and is expected to be submitted with the President's new legislative budget proposals.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Uranium Programs					
Operation and Maintenance	41,633	49,000	0	49,000	41,000
Construction	3,000	0	0	0	0
Total, Uranium Programs [a] [b]	44,633 [c]	49,000 [d]	0	49,000 [d]	41,000

[a] The HEU Transparency Measures program transferred to the Office of Nonproliferation and National Security and beginning in FY 2000 is no longer included in the Uranium Programs budget.

[b] Additional funding from the MOAs between USEC and DOE will be used in FY 1999 and FY 2000 for depleted uranium cylinder maintenance; construction of cylinder yards at Paducah and Portsmouth; and other depleted uranium activities.

[c] Excludes $19.2 million reprogrammed to the Uranium Enrichment Decontamination and Decommissioning Fund ($10.0 million) and the Fast Flux Test Facility ($9.2 million).

[d] Excludes $325 million emergency appropriation (P.L. 105-277) for the purchase of natural uranium associated with 1997 and 1998 deliveries under U.S./Russian HEU purchase agreement.

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	850	800	0	-800	-100.0%
Sandia National Laboratory	1,360	1,250	0	-1,250	-100.0%
Total, Albuquerque Operations Office	2,210	2,050	0	-2,050	-100.0%
Chicago Operations Office					
Argonne National Laboratory (East)	1,893	1,160	300	-860	-74.1%
Brookhaven National Laboratory	135	0	0	0	0.0%
New Brunswick Laboratory	555	530	0	-530	-100.0%
Total, Chicago Operations Office	2,583	1,690	300	-1,390	-82.2%
Nevada Operations Office	518	440	0	-440	-100.0%
Oakland Operations Office					
Oakland Operations Office	750	900	0	-900	-100.0%
Lawrence Livermore National Laboratory	7,179	5,615	400	-5,215	-92.9%
Total, Oakland Operations Office	7,929	6,515	400	-6,115	-93.9%
Oak Ridge Operations Office					
Oak Ridge Operations Office	11,325	9,197	10,400	+1,203	+13.1%
East Tennessee Technology Park	6,714	7,426	10,813	+3,387	+45.6%
Paducah Gaseous Diffusion Plant	8,407	5,064	5,849	+785	+15.5%
Portsmouth Gaseous Diffusion Plant	3,460	15,893	12,708	-3,185	-20.0%
Total, Oak Ridge Operations Office	29,906	37,580	39,770	+2,190	+5.8%
Richland Operations Office					
Pacific Northwest National Laboratory	45	25	530	+505	+2,020.0%
All Other Sites	1,442	700	0	-700	-100.0%
Total, Uranium Programs [a] [b]	44,633 [c]	49,000 [d]	41,000	–8,000	-16.3%

[a] The HEU Transparency Measures program transferred to the Office of Nonproliferation and National Security and beginning in FY 2000 is no longer included in the Uranium Programs budget.

[b] Additional funding from the MOAs between USEC and DOE will be used in FY 1999 and FY 2000 for depleted uranium cylinder maintenance; construction of cylinder yards at Paducah and Portsmouth; and other depleted uranium activities.

[c] Excludes $19.2 million reprogrammed to the Uranium Enrichment Decontamination and Decommissioning Fund ($10.0 million) and the Fast Flux Test Facility ($9.2 million).

[d] Excludes $325 million emergency appropriation (P.L. 105-277) for the purchase of natural uranium associated with 1997 and 1998 deliveries under U.S./Russian HEU purchase agreement.

Site Descriptions

Oak Ridge Operations

The Oak Ridge Operations (ORO) Office is one of the major Field Offices that support the U. S. Department of Energy's Nuclear Energy Program Office. ORO is responsible for fulfilling DOE's contractual liability with respect to retired management and operating contractor employees of the Paducah and Portsmouth facilities as well as retired power supplier employees, and for representing DOE in litigation activities arising from Uranium Enrichment activities prior to July 1, 1993. ORO also provides support for planning, developing, and executing strategies for the disposition of the DUF_6 inventory.

ORO is located in three sites: the Ohio site near Portsmouth, Ohio, the Kentucky site near Paducah, Kentucky, and the Tennessee site located in Oak Ridge Tennessee.

East Tennessee Technology Park (formerly K-25 site)

The East Tennessee Technology Park (ETTP) is located in Oak Ridge, Tennessee, and is responsible for supporting the nuclear safety activities required to meet Departmental obligations under the Energy Policy Act of 1992 by assisting the NRC in the preparation of an annual report to Congress on the status of health, safety, and environmental conditions at the GDPs, Management Oversight of the Enrichment Facilities Operations, the management of U.S. Department of Energy liabilities arising from Uranium Enrichment activities prior to July 1, 1993, the DUF_6 Cylinder Maintenance project which has the responsibility to safely store the existing inventory of DUF_6 until ultimate disposition of the material, the DUF_6 Conversion tasks, and the administration of the Lease Agreement between DOE and the United States Enrichment Corporation (USEC Inc.).

Paducah Gaseous Diffusion Plant

The Paducah Gaseous Diffusion Plant is located on 3,423 acres near Paducah, Kentucky, and is responsible for supporting several activities including: (1) review and update of Safety Analysis Reports as necessary, and assistance with the preparation of NRC's annual report to Congress; (2) the maintenance of nonleased facilities which includes effort in both active and inactive facilities to protect the safety and health of personnel and the environment as well as biological monitoring activities at the Paducah Gaseous Diffusion Plant; (3) the PCB Program which includes activities related to achieving and maintaining compliance with Toxic Substance Control Act of 1976 (TSCA), the Uranium Enrichment TSCA Federal Facilities Compliance Agreement, and DOE Orders and other applicable requirements. Specific PCB activities include oversight of the collection and containment system, management of TSCA regulated PCB spill sites, and management of waste generated from these activities; and (4) the DUF_6 Cylinder Maintenance activity which has the responsibility to safely store the existing inventory of DUF_6 until ultimate disposition of the material.

Portsmouth Gaseous Diffusion Plant

The Portsmouth Gaseous Diffusion Plant is located on 3,714 acres near Portsmouth Ohio, and is responsible for supporting several activities including: (1) the HEU Equipment Shutdown and Inventory Disposition Program which removes all HEU materials (materials with assays greater than 20%) from the Portsmouth site, as well as buffering shut down production equipment for nuclear criticality safety purposes, program and business management, safety authorization basis management, and other technical support associated with HEU material; (2) review and update Safety Analysis Reports as necessary, and assistance with the preparation of NRC's annual report to Congress; (3) the maintenance of nonleased facilities which includes effort in both active and inactive facilities to protect the safety and health of personnel and the environment of nonleased facilities at the Portsmouth Gaseous Diffusion Plant; (4) the PCB Program which includes activities related to achieving and maintaining compliance with Toxic Substance Control Act of 1976 (TSCA), the Uranium Enrichment TSCA Federal Facilities Compliance Agreement, and DOE Orders and other applicable requirements. Specific PCB activities include oversight of the collection and containment system, management of TSCA regulated PCB spill sites, and management of waste generated from these activities; and (5) the DUF_6 Cylinder Maintenance activity which has the responsibility to safely store the existing inventory of DUF_6 until ultimate disposition of the material.

Argonne National Laboratory

Argonne National Laboratory, through its offices at 9700 S. Cass Avenue, Argonne, Illinois and at 955 L`Enfant Plaza, Washington, D.C., is providing scientific and engineering expertise to the U.S. Department of Energy Office of Nuclear Facilities Management related to management of depleted uranium hexafluoride.

As part of this support, Argonne is conducting engineering and cost evaluations of options for storage and use of the depleted uranium inventory. Argonne is supporting the Department by managing a programmatic environmental impact statement that examines the environmental, health, safety and socioeconomic impacts of alternative management strategies for the depleted uranium inventory. In addition, Argonne is examining potential uses of materials derived from depleted uranium hexafluoride that can provide an overall economic benefit to the Government.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory, through its Germantown, Maryland office and parent Livermore, California facility, provides scientific and engineering expertise related to management of DUF_6.

Areas of technical expertise provided include: materials technology, testing expertise and testing facilities, safety analyses, quality program analyses, transportation safety analyses, facility design and development, engineering analysis, cost modeling and analysis, and other technical support as requested.

Pacific Northwest National Laboratory

Pacific Northwest National Laboratory is located in Richland, Washington and provides scientific and engineering expertise related to management of depleted uranium.

Areas of technical expertise provided include: material properties research, alloy development, thermo-mechanical processing, coatings technology, fabrication technology development, depleted uranium product development, and other technical support as requested.

All Other Sites

Funding provided to universities, industry, other federal agencies, and other activities to support Uranium Programs activities.

Operation and Maintenance

Mission Supporting Goals and Objectives

Uranium Programs' activities are primarily focused on accomplishing three major goals:

The first goal is to manage facilities not leased by the USEC in a safe, economic, and environmentally-sound manner. Uranium Programs activities at the gaseous diffusion plants in Portsmouth, Ohio; Paducah, Kentucky; and Oak Ridge, Tennessee include maintenance of facilities and grounds, cleaning legacy PCB spills, guarding and protecting HEU material stored at the Portsmouth site, addressing financial liabilities by paying post retirement life and medical costs for retired contractor personnel at the diffusion sites and power suppliers, providing legal representation for existing lawsuits, and reviewing and updating Safety Analysis Reports (SARs) as necessary, for the non-leased facilities and assisting the NRC in preparing annual congressional reports on the status of the diffusion plants. Highlights in support of this goal include:

- Consistent with the requirements of the 1992 Energy Policy Act, continue to pay retired employee post-retirement life and medical benefits and legal representation on behalf of DOE for lawsuits against DOE.

- Continue residual safeguards and security costs for a small contingent of guards and one building with HEU inventories as most material is removed from the HEU building X-326 at Portsmouth, and perform maintenance and surveillance of the shut down HEU equipment.

- The major activity related to nuclear safety was completed March 3, 1997, when the NRC assumed the regulatory authority of the leased gaseous diffusion plants. For FY 2000, Uranium Programs will continue review and update Safety Analysis Reports (SARs) as necessary, for the non-leased facilities, and assist with preparation of NRC's annual report to Congress.

- Continue to perform routine maintenance activities at the non-leased facilities. Activities include safety and health inspections, and corrective maintenance. The program will maintain PCB troughing systems in the process buildings leased to USEC, which involves routine inspections, repairs, spill cleanup and laboratory analysis.

The second goal is to ensure that the estimated 46,400 cylinders within the DOE inventory of depleted uranium hexafluoride are maintained in an environmentally responsible manner by conducting annual inspections and exploring options to effectively treat cylinders that exhibit accelerated corrosion. The Department is completing an environmental impact statement on the long-term management of its inventory of depleted uranium hexafluoride. We expect to issue a record of decision (ROD) by mid-FY 1999.

The DUF_6 Cylinders and Maintenance program maintains the current DOE-generated DUF_6 inventory to assure safe storage. Cylinder management involves the general maintenance and monitoring of the estimated 46,400 DUF_6 cylinders, including such activities as:

- Annually inspect DUF_6 cylinders, repair defective cylinder valves as required, maintain procedures for conduct of operation, and maintain data base, including updating of inspection data. Conduct quadrennial inspections of other DUF_6 cylinders. Develop remote sensing inspection technologies to detect cylinder leaks and determine cylinder wall condition.

- Relocate DUF_6 storage cylinders to permit 100 percent visual inspection and ultrasonic inspection and procure concrete saddles (cylinders sit on saddles).

- Continue the control of cylinder corrosion by surface cleaning and painting.

- Construction and reconstruction of cylinder storage yards.

In addition to appropriations required for management of DOE-generated depleted uranium hexafluoride, the Department received in FY 1998 $66 million from the U.S. Enrichment Corporation for the management and disposition of about 11,200 of additional USEC-generated depleted uranium cylinders. In response to the FY 1999 appropriations language, the Department submitted, on December 17, 1998, its initial plan for applying the $66 million received from USEC. These funds are administered in accordance with the terms of the two Memoranda of Agreement (MOAs) and related correspondence for activities required to accept and maintain the USEC material. The Department will revise its plan for applying the $66 million received from USEC and intends to include the revisions in the President's *Plan for the Conversion of Depleted Uranium Hexafluoride* required under P.L. 105-204.

The draft *Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride* (PEIS) was issued in December 1997 and the final PEIS identifying the Department's preferred alternative is currently scheduled for completion in February 1999. The record of decision (ROD) for the proposed action is scheduled to be issued in mid-FY 1999.

As discussed above, the Department will submit a plan to begin construction of DUF_6 conversion facilities at the GDP sites by January 2004. To support construction start in January 2004, the Department has requested $5.0M in appropriations to conduct NEPA and procurement activities. This law authorized the use of approximately $373 million identified by USEC for the disposition of DUF_6, and specifically, to enable the construction of plants to convert the material. The Department's plan will be forwarded by the President with his FY 2000 legislative proposals.

The third goal of Uranium Programs is to manage the sale of the Department's excess inventory of natural uranium. The sale of these inventories is accomplished in a manner which will maximize the return to the U. S. government while ensuring such sales meet the intent of the USEC Privatization Act and do not have an adverse material impact on domestic uranium industries. The Department performs analysis in consultation with the uranium industry in support of the Secretary of Energy's determination with regard to the sale of excess Departmental uranium on the uranium industries.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Highly Enriched Uranium Equipment Shutdown and Inventory Disposition	0	11,500 [a]	3,700	-7,800	-67.8%
Maintenance of Leased and Non-Leased Facilities Including Corrective Actions and Nuclear Safety	3,807	7,757	10,400	+2,643	+34.1%
Pre-existing Liabilities	8,587	6,037 [b]	8,400	+2,363	+39.1%
Depleted Uranium Hexafluoride Cylinders and Maintenance	12,863	10,126	10,874	+748	+7.4%
Depleted Uranium Hexafluoride Conversion	976	0	7,563 [c]	+7,563	+100.0%
Transparency Measures [d]	15,400	13,580	0	-13,580	-100.0%
SBIR	0	0	63	+63	+100.0%
Total, Operation and Maintenance [e]	41,633 [f]	49,000 [g]	41,000	-8,000	-16.3%

[a] Excludes $8.0 million in prior year balances.

[b] Excludes $2.55 million of prior year balances.

[c] Includes $5 million requested from P.L. 105-204.

[d] The HEU Transparency Measures program transferred to the Office of Nonproliferation and National Security and beginning in FY 2000 is no longer in the Uranium Programs budget.

[e] Additional funding from the MOAs between USEC and DOE will be used in FY 1999 and FY 2000 for depleted uranium cylinder maintenance; construction of cylinder yards at Paducah and Portsmouth; and other depleted uranium activities.

[f] Excludes $19.2 million reprogrammed to the Uranium Enrichment Decontamination and Decommissioning Fund ($10.0 million) and the Fast Flux Test Facility ($9.2 million).

[g] Excludes $325 million emergency appropriation (P.L. 105-277) for the purchase of natural uranium associated with 1997 and 1998 deliveries under U.S./Russian HEU purchase agreement.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Highly Enriched Uranium Equipment Shutdown and Inventory Disposition			
# Residual safeguards and security costs for a small contingent of guards and one building as all material is removed from HEU building X-326 by the end of FY 1999	8,563	7,107	2,420
# Surveillance and maintenance activities associated with the 158 permanently shut down cells in the HEU building X-326	520	807	761
# Removal of HEU material and power and utilities required for the 158 shutdown cells in X-326 and limited operation of building X-345 (HEU vault)	4,430	3,074	281
# Oversight and management of the HEU removal program is reduced as material is dispositioned	438	512	238
# No work scope for IAEA inspections support in FY 1999 and FY 2000	49	0	0
# The Department received a one-time credit for the purchase of contractual services from the USEC associated with a higher than expected quantity of low enriched uranium that USEC was able to derive from the dilution of highly enriched uranium transferred by the Department. The credit was subsequently used as a funding source for the $19.2 million reprogramming to the Uranium Enrichment Decontamination and Decommissioning Fund ($10.0 million) and the Fast Flux Test Facility (FFTF) ($9.2million)	-14,000	0	0
Total, Highly Enriched Uranium Equipment Shutdown and Inventory Disposition	0	11,500 [a]	3,700

[a] Excludes $8.0 million of prior year balances.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Maintenance of Leased and Non-Leased Facilities Including Corrective Actions and Nuclear Safety			
# Management of PCB activities associated with maintaining compliance with the Toxic Substance Control Act (TSCA), the Uranium Enrichment TSCA Federal Facilities Compliance Agreement (FFCA), DOE orders and other requirements	3,060	3,621	4,211
# Minimal corrective maintenance and inspection of 5 active and 29 inactive facilities at the Portsmouth and Paducah sites . .	4,522	3,234	4,989
# Support for Annual Report to Congress on the status of environmental, safety, and health (ES&H) conditions at the Gaseous Diffusion Plants, as required by the Energy Policy Act of 1992, and the annual Safety Analysis Report (SAR) update for the non-leased facilities	1,075	392	800
# Environmental monitoring activities as required by the Kentucky Pollutant Discharge Elimination System (KPDES) including toxicity monitoring for liquid effluents, in-stream monitoring for PCBs in fish, in-stream ecological monitoring of the biotic community, and a small mammals study	350	510	400
# The Department received a one-time credit for the purchase of contractual services from the USEC associated with a higher than expected quantity of low enriched uranium that USEC was able to derive from the dilution of highly enriched uranium transferred by the Department. The credit was subsequently used as a funding source for the $19.2 million reprogramming to the Uranium Enrichment Decontamination and Decommissioning Fund ($10.0 million) and the Fast Flux Test Facility ($9.2 million).	-5,200	0	0
Total, Maintenance of Leased and Non-Leased Facilities Including Corrective Actions and Nuclear Safety	3,807	7,757	10,400

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Pre-Existing Liabilities			
# Contractual liability for Lockheed Martin Energy Systems (LMES) post-retirement life and medical expenses for 2,300 employees with service prior to July 1, 1993	6,942	5,362 [a]	8,000
# Outside counsel attorney fees and expenses for about 7 open class action, unfair labor practices, civil rights/wrongful discharge and other litigation against the Department	1,645	675	400
Total, Pre-Existing Liabilities	8,587	6,037	8,400
Depleted Uranium Hexafluoride Cylinders and Maintenance			
# Relocation of a few DOE cylinders to improve storage conditions	2,495	300	70
# Personnel, equipment, and materials to recoat about 1,200 DOE cylinders to provide a barrier between the cylinder wall and the moist environment that contributes to the deterioration of the cylinder	2,279	4,300	2,454
# Personnel and materials necessary to monitor cylinder and storage yards. Conduct annual inspections, quadrennial inspections, and wall thickness inspections at Paducah, Portsmouth, and Oak Ridge	796	1,200	1,400
# Management and general maintenance of an estimated 46,400 cylinders and 16 cylinder yards at Paducah, Portsmouth and Oak Ridge	4,756	3,426	6,450
# Materials and personnel performing engineering development type work necessary to sustain, optimize and enhance the cylinder storage system.	567	900	500
# PEIS scheduled to be released early FY 1999	1,970	0	0
Total, Depleted Uranium Hexafluoride Cylinders and Maintenance	12,863	10,126	10,874

[a] Excludes $2.55 million of prior year balances.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Depleted Uranium Hexafluoride Conversion			
# Research and development on alternative uses of depleted uranium hexafluoride for possible government applications which may reduce the cost of Federal Government Programs .	976	0	2,563
# Preparation of site specific NEPA activities in accordance with the P.L. 105-204 plan to begin construction of a conversion facility(s) by FY 2004	0	0	3,000 [a]
# Preparation of Request for Proposals for a conversion facility(ies) to meet the schedule in accordance with P.L. 105-204	0	0	2,000 [a]
Total, Depleted Uranium Hexafluoride Conversion	976	0	7,563
Transparency Measures			
# The transparency measures program has been transferred from of the Office of Nuclear Energy, Science and Technology to the Office of Nonproliferation and National Security, and beginning in FY 2000 is no longer included in the Uranium Programs budget	15,400	13,580	0
Small Business Innovative Research and Small Business Technology Transfer Programs			
# FY 99/00 Small Business Innovative Research and Small Business Technology Transfer Programs	0	0	63
Total, Operation and Maintenance	41,633	49,000 [b]	41,000

[a] Funds requested from the USEC account under P.L. 105-204.

[b] Excludes $325 million emergency appropriation (P.L. 105-277) for the purchase of natural uranium associated with 1997 and 1998 deliveries under U.S./Russian HEU purchase agreement.

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Highly Enriched Uranium Equipment Shutdown and Inventory Disposition	
# Safeguards costs will decrease once the Department's HEU oxide inventories are removed from the Portsmouth site during FY 1999	-7,800
Maintenance of Leased and Non-Leased Facilities Including Corrective Actions and Nuclear Safety	
# Reflects increased costs for PCB disposal and other corrective maintenance activities	+2,643
Pre-existing Liabilities	
# Funding in FY 1999 was supplemented by prior year balances of $2.55 million within the pre-existing liabilities account. Therefore, there is no real increase in this activity in FY 2000	+2,363
Depleted Uranium Hexafluoride Cylinders and Maintenance	
# Reflects a minimal increase for the continuation of required depleted uranium cylinders and cylinder yard maintenance activities.	+748
Depleted Uranium Hexafluoride Conversion	
# Reflects implementation of research and development activities associated with finding alternative government uses for depleted uranium hexafluoride	+2,563
# Funds requested from the USEC account under P.L. 105-204.	+5,000
Total, Depleted Uranium Hexafluoride Conversion	+7,563

	FY 2000 vs. FY 1999 ($000)
Transparency Measures	
# The Transparency Measures program has been transferred from of the Office of Nuclear Energy, Science and Technology to the Office of Nonproliferation and National Security, and beginning in FY 2000 is no longer included in the Uranium Programs budget	-13,580
Small Business Innovative Research and Small Business Technology Transfer Programs	
# Funding required to support the Small Business Innovative Research and Small Business Technology Transfer Programs	+63
Total Funding Change, Operation and Maintenance	-8,000

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
General Plant Projects	128	150	0	-150	-100.0%
Capital Equipment	185	555	220	-335	-60.4%
Total, Capital Operating Expenses	313	705	220	-485	-68.9%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
98-U-200 DUF_6 Cylinder Storage Yards, K-25 Site, Oak Ridge, TN	5,700	0	400	0	0	5,300
96-U-201 DUF_6 Cylinder Storage Yards, Paducah, KY Gaseous Diffusion Plant	34,000	7,000	2,600	0	0	24,400
Total Construction		7,000	3,000	0	0	29,700